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A REVISION OF THE NORTH AMERICAN SPECIES
OF THE GENUS CHORIZANTHE¹

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HISTORY OF THE GENUS

When Bentham² treated the tribe Eriogoneae in 1836, three genera were considered, namely, *Eriogonum*, *Chorizanthe*, and the then-monotypic *Mucronea*. The latter two were described as new, *Chorizanthe* having been a manuscript name of Robert Brown. Eleven species of *Chorizanthe* were described at this time, seven from South America and four from North America. Bentham³ also elaborated the genus for De Candolle's 'Promodrus,' eighteen species being considered there.

In 1870 Torrey and Gray⁴ revised the North American members of the genus. It was in this paper that *Acanthogonum* was reduced to synonymy under *Chorizanthe*, and *Mucronea* had already suffered a similar fate at the hands of the junior author.⁵ Torrey and Gray's revision appears in a condensed

¹ An investigation carried out at the Missouri Botanical Garden in the Graduate Laboratory of the Henry Shaw School of Botany of Washington University, and submitted as a thesis in partial fulfillment of the requirements for the degree of doctor of philosophy in the Henry Shaw School of Botany of Washington University.

² Benth. Trans. Linn. Soc. Lond. 17: 401-420. pl. 17-20. 1836.

³ Benth. in DC. Prodr. 14: 24-27. 1857.

⁴ Torr. & Gray, Proc. Am. Acad. 8: 192-199. 1870.

⁵ Gray, Proc. Bost. Soc. Nat. Hist. 7: 149. 1859.

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form in the appendix of Watson's⁶ 'Botany of the United States Geological Exploration of the Fortieth Parallel.'

Numerous collections from the western states were accumulating in herbaria during this time, resulting in the discovery of many new species. In 1877 Watson⁷ found it advisable to revise again the North American members of the genus, together with the other genera of the Eriogoneae. Twenty-five species were recognized in this revision, and *Centrostegia* Gray was relegated to *Chorizanthe*.

The last revision was made by Parry⁸ in 1884, and Dammer's⁹ brief treatment of the genus in Engler and Prantl's 'Natürlichen Pflanzenfamilien' is patterned in some part after Parry's work. Several desultory descriptions have appeared since Parry's revision, bringing the total number of described species for this country, including the six species from other genera which were united with *Chorizanthe*, to something over fifty.

Four related genera, *Mucronea* Benth., *Acanthogonium* Torr., *Centrostegia* Gray, and *Lastarriaea* Remy, have at various times been considered by some taxonomists as synonymous with *Chorizanthe*. The genus *Lastarriaea* is considered congeneric with *Chorizanthe* in the present work, and the other three genera are held to be distinct.

The genus *Hamaria* Kunze, Poepp. Coll. Chil. I, is cited by Reichenbach¹⁰ in his 'Conspectus' as of the family Rosaceae. The leading subsequent bibliographic works in which *Hamaria* Kunze appears also have definitely or questionably referred the genus to the Rosaceae. However, Baillon¹¹ places the genus in the Polygonaceae, with *Lastarriaea* as its synonym. Some basis is found for this in an article by Parry¹² in which he states that a sheet of *Lastarriaea* at Kew is marked "50 Poppig, Pl. Chil. Hamaria Poppigii, Ky. . . . Parony-

⁶ Wata. U. S. Geol. Surv. Fortieth Parallel [Bot. King's Exp.] 5: 484-485. 1871.

⁷ Wata. Proc. Am. Acad. 12: 269-273. 1877.

⁸ Parry, Proc. Davenp. Acad. Sci. 4: 45-63. 1884.

⁹ Dammer in Engl. & Prantl, Nat. Pflanzenfam. 3^{te}: 11-12. 1891.

¹⁰ Reichenb. Conspectus, 212b. 1828.

¹¹ Baillon, Hist. d. Pl. 11: 397. 1892.

¹² Parry, West. Am. Sci. 1: 29. 1885.

chiaceae? . . ." With this evidence at hand, the name is listed in the generic synonymy.

In Torrey and Gray's revision, *Chorizanthe membranacea* Benth. is listed as the first species of section Euchorizanthe. Watson followed this precedent, while Parry chose *C. stellata* Benth. as the first species in the group of typical Chorizanthes. However, *Chorizanthe virgata* Benth., a South American species, is listed first in Bentham's original work, where it is both described and figured, so it must be accepted as the type species. There is a fortunate aspect to this change in that *C. virgata* is a typical *Chorizanthe* and *C. membranacea* is considered by the present writer as a member of a new genus.

The history of the South American members is brief. In addition to the species of Bentham, there are two by Remy¹³ and sixteen by Philippi, five of the latter appearing in 1864-65,¹⁴ one in 1873,¹⁵ and the remainder in 1895.¹⁶

The tribe Eriogoneae is a very distinct one of the Polygonaceae. Meisner¹⁷ gave the group of genera, *Pterostegia*, *Mucronea*, *Chorizanthe*, and *Eriogonum*, family rank. However, the floral structure, as well as other morphological characteristics, indicates the natural affinities of the genus with the Polygonaceae.

The additional amount of North American material of the genus which has accumulated in herbaria during the past few years allows a study to be much more comprehensive than heretofore, and makes such a study advisable.

GENERAL MORPHOLOGY

Roots.—All of the North American representatives of the genus are annuals, and the root system consists of but a slender tap-root with small lateral roots.

Stems.—The stems vary from erect to prostrate, and are from one to several from the base. They are dichotomously branched or, in some species, frequently trichotomously

¹³ Remy in Gay, Fl. Chili 5: 287, 288. 1849.

¹⁴ Philippi, Linnaea 33: 225-227. 1864-1865.

¹⁵ Philippi, Anal. Univ. Chili 1873: 536. 1873.

¹⁶ Philippi, I. c. 91: 494-500. 1895.

¹⁷ Meissn. Pl. Vasc. Gen. 1: 317; 2: 229. 1836-1843.

branched at the first node. The stems are from a half to five decimeters long, and nearly always slender and rather stiff. They vary from hirsute to glabrate.

Leaves.—The leaves are always basal or nearly so, and entire. Commonly they are petiolate, oblanceolate, and obtuse, and two to ten centimeters long. In some of the species, the leaves may be scantily pubescent but usually they are tomentose or densely short-villous beneath and short-villous above. The leaves are very prone to fall from the mature plants.

Bracts.—The bracts are characteristically opposite, although the foliaceous bracts of some species, as *C. interposita*, *C. Douglasii*, and *C. stellulata*, are verticillate. The bracts subtending the involucres are regularly narrowly lanceolate-acerose and ciliate, and sometimes all the bracts are of this type, as is manifested by certain species in the subsections Staticoideae and Flavae. Very frequently the lower bracts are foliaceous and often simulate the leaves very closely. Opposite, oblanceolate, foliaceous bracts are characteristic of the subsection Pungentes.

Pubescence.—The pubescence is of unicellular white hairs, and the various species are prevailingly canescent with straight or curly, appressed or spreading hairs. The pubescence on the stems is often characteristic for a subsection—widely spreading hairs prevailing in the Pungentes, while an unusual type of pubescence is found on the stems of members of the subsection Staticoideae. Here the hairs are down-curved for a short distance, then abruptly appressed, giving them a hook-like appearance. Thicker, crystal-clear hairs are unique in *C. Wheeleri*, where they are found upon the involucres.

Inflorescence.—The inflorescence is always cymose, and the involucres are sessile in the axils. Most commonly the involucres are borne in clusters or dense heads, this structure being attained, of course, through the great foreshortening of the internodes. In some species, as *C. staticoides*, for example, this foreshortening takes place about equally, and at first gradually, on each branch of the cyme, making the whole inflorescence more or less flat-topped. Again, the foreshortening may occur very abruptly, resulting in a single dense head, as is

often found in *C. stellulata*. One of the most common modifications of the inflorescence, however, has resulted in the development of a sort of uniparous cyme. Here but one branch develops in an elongate manner from each node, and the development occurs alternately at each successive node. The opposite, or foreshortened, branch from each node, instead of subtending only a flower, or bearing a flower, subtends one and bears several in a close cluster. For convenience, this type of inflorescence has been termed a compound uniparous cyme. It is prevalent in the Pungentes and Procumbentes.

Involucres.—The involucres, composed usually of six connate bracts, form a more or less tubular protective organ for the perianth. They are two to seven millimeters long, and six-toothed, except in the subsection Flavae, where the smaller three teeth are sometimes obsolete, and in some of the subsection Chorizanthella, where the number is three, or, in the unusual *C. Watsoni*, five.

The involucres are usually dimorphic. The few solitary ones in the lower axils are larger and less modified than the ultimate ones, and are thought to possess the characters of more or less immediate ancestors. They do not have characters suitable for taxonomic diagnosis. The involucres hereafter referred to are the typical ultimate ones.

Of the six-toothed involucres, three of the teeth, including the anterior one, are usually larger than the alternating trio, and are spoken of as the "outer" or "larger" teeth, while the alternating three are known as the "inner" or "smaller" teeth. The teeth are spine-pointed, and the spines are down-curved or uncinate except in a few species, as *C. Howellii*, *C. villosa*, and *C. valida*.

In many species, the anterior involucral tooth is detectably longer than any of the others. Inasmuch as this condition is found in the species whose involucres are in dense clusters, it is thought that perhaps the lack of pressure on the anterior tooth has permitted or caused its additional growth. This mechanical explanation alone would hardly account for the development of the very long spines of *C. Clevelandii* and *C. uniaristata*. Possibly the germ plasm of plants is affected

by environmental stimuli, and the long anterior teeth of these last two species of the *Uniaristatae* now have a genetic cause—a theory which harkens back to Erasmus Darwin.

In one North American representative, *C. Lastarriaea* var. *californica*, the involucres are entirely lacking. This entity, commonly known heretofore as *Lastarriaea chilensis* Remy, has given rise to considerable discussion concerning its morphology. Authors prior to Parry had considered the structure which contained the reproductive organs as an involucre-like perianth. Parry,¹⁸ in his revision, placed the species in *Chorizanthe*, stating that he had observed small structures in the so-called involucre-like perianth which represented a true, though vestigial, perianth, and hence the "involucre-like perianth" was a true involucre. Parry¹⁹ maintains his position in a short article in the 'Western American Scientist.' The same year Mrs. Curran²⁰ criticised Parry's view, and stated: "As to the theory which has been advanced, that the perigonium of *Lastarriaea* is to be considered as an involucre, with adnate, nearly obsolete perianth, I can only say, that with some slight skill in the use of the microscope, I have been unable to find any trace of such organ" [p. 273]. Both were right, for the structures in question are present in some instances and quite lacking in others. Mrs. Curran was answered a little testily by Parry,²¹ who still felt that he was correct. The next year, however, Parry²² decided that Mrs. Curran was more nearly right than himself, and again recognized the genus *Lastarriaea*.

The present writer accepts, essentially, Parry's temporary disposition of *Lastarriaea* under *Chorizanthe*, but for very different reasons. The contention of Mrs. Curran, and earlier and subsequent workers, that the envelope surrounding the reproductive organs of the species in question was an involucre-like perianth is certainly correct. This involucre-like

¹⁸ Parry, Proc. Davemp. Acad. Sci. 4: 47. 1884.

¹⁹ Parry, West. Am. Sci. 1: 29-31. 1885.

²⁰ Curran, Bull. Cal. Acad. Sci. 1: 272-275. 1885.

²¹ Parry, Bot. Gaz. 11: 54-56. 1886.

²² Parry, Proc. Davemp. Acad. Sci. 5: 35-36. 1887.

perianth is subtended by four or five bracts which are subverticillate but distinct—that is, they do not form a tubular involucre. A most interesting connecting link has been observed (described below as *C. interposita*) which possesses the more or less involucriform perianth plus a true involucre! The situation may be explained by referring to diagram *a* of fig. 1. Here two pairs of bracts of a typical *C. Lastarriaea* var.

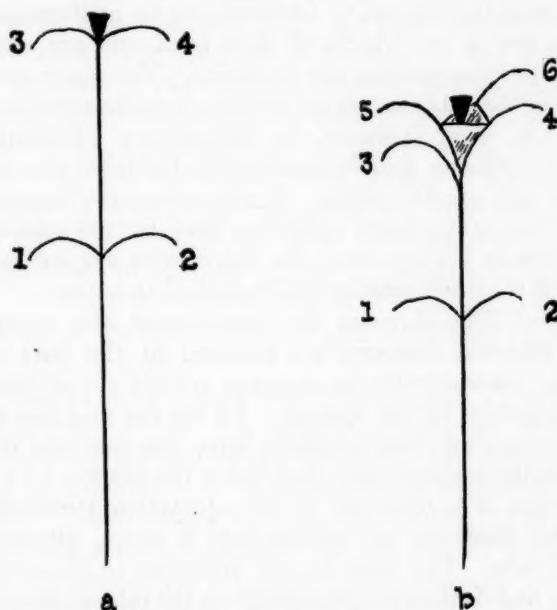


Fig. 1. Diagrammatic representation of the bracts subtending the perianths of (a) *C. Lastarriaea* var. *californica* and (b) *C. interposita*.

californica are indicated, and numbered 1 and 2, and 3 and 4. The position of the perianth is indicated by the triangle. In *C. interposita*, another pair of bracts is present (diagram *b* of fig. 1), numbered 5 and 6. Bracts 1, 2, and 3 are still distinct, as in fig. *a*, but bract number 4 and the pair of bracts 5 and 6 are united below, forming a true involucral tube of a three-toothed

involucre. In the diagrams, the internodes have been elongated for the sake of clarity. *C. interposita* is quite inseparable morphologically from *Chorizanthe*, but it closely resembles *C. Lastarriaea* var. *californica*.

Perianths.—The perianths have as their most important character a tubular portion which constitutes at least half of the length of the flower. They are commonly sessile or nearly so, and subcylindric. The lobes or segments are six in number, or but five in the unusual *C. Lastarriaea* var. *californica*. The six lobes are in two whorls of three each, and are commonly sparsely pubescent along the midveins. The shape and relative size of the outer and inner whorls often characterize entire subsections. For instance, in subsections *Chorizanthella*, *Pungentes*, *Flavae*, and *Procumbentes*, the lobes are equal or subequal and usually entire. In the subsection *Staticoideae*, the lobes are prevailingly entire but the inner are smaller. In the subsection *Uniaristatae*, the outer lobes are entire or bilobed, and the inner smaller and fimbriate to erose.

Stamens.—The stamens are prevailingly nine in number, and the glabrous filaments are inserted at the base of the perianth. Occasionally the stamens are but six or three, but usually constant for the species. All but the first two species of the subsection *Chorizanthella* have the stamens inserted well up on the perianth tube, just below the lobes. An unusual development is manifested in the subsection *Procumbentes*, where the filaments are united into a short, pilose-ciliate, staminal tube. The anthers are orbicular to linear-oblong, versatile, and dehisce longitudinally on the lateral faces. The pollen is spherical, small, and smooth.

Fruit.—The fruit consists of a dry achene which is triangular in cross-section, elongated, and smooth or rarely papillose. The achenes are tri-carpellary and one-celled. The styles are three, and commonly at least half as long as the achene, and terminated by a small, capitate stigma. The ovule is solitary, basal, and orthotropous, containing at maturity abundant mealy endosperm and a straight or nearly straight embryo with essentially linear cotyledons.

RELATIONSHIP OF THE GENUS, AND THE GENERIC CONCEPT

The genus *Chorizanthe* falls definitely in the tribe Eriogoneae of the Polygonaceae because of the prevailing presence of a more or less tubular involucre and the absence of ochreæ. Of the genera of the tribe which possess tubular involucres, *Chorizanthe* is differentiated from all but two, *Acanthogonum* and *Eriogonella*, by the prevalence of but one flower in an involucre.²³ It is differentiated from all but *Acanthogonum* by the possession of a perianth tube, and from this latter genus it differs constantly in the shape of the embryo, and prevailingly in the six-toothed, rather than three-toothed, involucres, and the basal, rather than facial, insertion of the stamens.

In delimiting the genera of this group which possess cup-shaped or tubular involucres, the condition of the perianth is considered to be of primary importance. This organ may be either parted or divided, or lobed. Whether the cotyledons are accumbent or straight is also of paramount importance. The morphology of the involucres, the lobing of the bracts, and the nature of the tomentum, are also significant in delimiting the genera concerned.

A glance at the accompanying diagram (fig. 2) will indicate the occurrence of two fundamental characters which have helped cause *Mucronea*, *Acanthogonum*, *Centrostegia*, and the new genus *Eriogonella* to be recognized generically in the present work. *Centrostegia*, for example, has long been united by taxonomists with *Chorizanthe*, but the parted perianth segments, the accumbent cotyledons, the glandular pubescence, and the three-cleft bracts, all show the genus to be much more closely related to *Oxytheca*. *Mucronea* has essentially the same characters except that involucral spurs are always lacking and the cotyledons are straight—thereby differentiating it from *Centrostegia* or *Oxytheca*. The former *Chorizanthe membracea* and *Chorizanthe spinosa* each have parted perianth segments and accumbent cotyledons, definitely barring them

²³ Parry reports two flowers in some specimens of *C. Orotettiana*, and Greene says that there are "2 or more" in his *C. Nortonii*. The author has never seen but one flower in an involucre.

from *Chorizanthe*. The entire bracts, the non-glandular pubescence, and the solitary flowers prevent them from being united to *Oxytheca* or *Centrostegia*. It is thought that their nearest relative is *Eriogonum*. From this large genus they

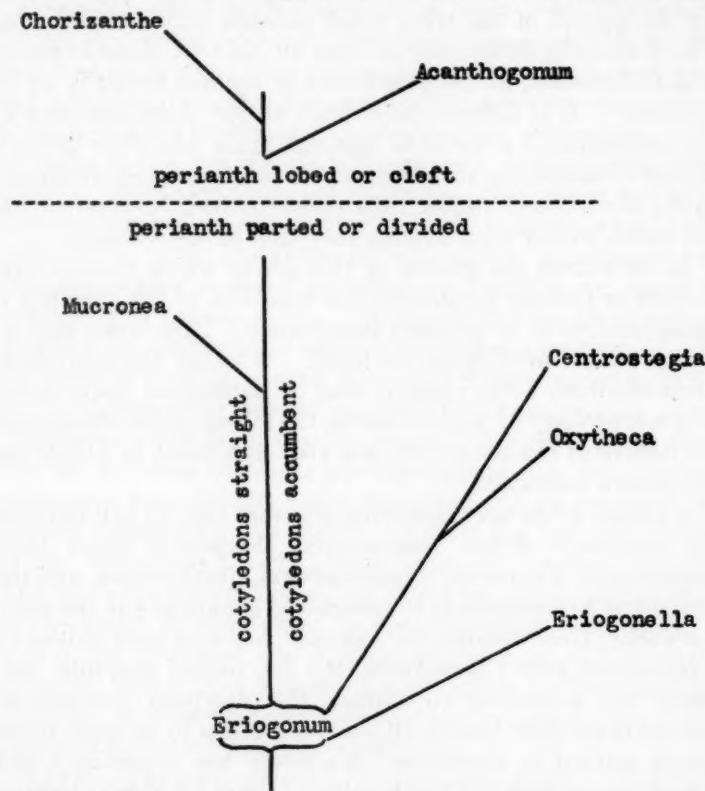


Fig. 2. Diagram to show relationships of seven related genera of the Eriogoneae.

are differentiated by the solitary flowers and spine-toothed involucres. The genus *Eriogonella*, to which these two species are referred, is formally characterized on page 90. These several smaller genera will be treated taxonomically in a subsequent paper.

Superficial resemblances can not be too greatly depended upon in this group because epiharmonic evolution has too often played a part. For example, the morphology of *Centrostegia* and *Oxytheca* is very similar, as already explained, yet *Centrostegia* has been referred to *Chorizanthe* on the basis, largely, of appearance. *Oxytheca perfoliata* and *Mucronea perfoliata* have developed very similar aspects, yet are certainly generically distinct. Perhaps it is the environment which has governed in part these similar developments, because certain southern California species of *Gilia* and *Nemadladus* simulate surprisingly annual members of the Eriogoneae.

While the detailed phylogeny of the tribe is reserved for the next paper on the Eriogoneae, it might be remarked here that a reduction series can be traced from many-flowered, fruticose forms (as in many Eriogonums) to few- or one-flowered annuals. An accurate phylogeny is thought to be more similar to that depicted by Gross²⁴ in his morphologic study of the Polygonaceae than the one outlined by Dammer.²⁵ Gross considers such genera as *Oxytheca*, *Centrostegia*, and *Chorizanthe* as derived from *Eriogonum*, whereas Dammer would reverse the sequence, with *Eriogonum* as the most "advanced" member.

PHYLOGENY OF THE SPECIES: THE SUBGENERIC CATEGORIES

The South American perennial members of the genus possess several characters which, when compared with characters manifested by North American species, are accepted to-day by morphologists as being primitive. Some of the characters found in this South American group are, besides the perennial habit, the six subsimilar teeth of the involucres, which are short in comparison with the length of the involucral tube, the similar perianth lobes, and the nine stamens, which are attached below the middle of the perianth tube. In the North American species the annual habit is constant, and variations in the other characters are prevalent or frequent.

²⁴ H. Gross in Engl. Bot. Jahrb. 49: 234-339. 1913.

²⁵ Dammer in Engl. & Prantl, Nat. Pflanzenfam. 3^{1a}: 11-12. 1891.

A list of the significant characters are contrasted as follows:

PRIMITIVE	ADVANCED
Perennial habit	Annual habit
Leaves caudate	Leaves basal
Involucral teeth subsimilar and short	Involucral teeth alternatingly long and short
Involucral teeth six	Involucral teeth five or three
Perianth lobes similar	Perianth lobes dissimilar
Perianth lobes entire	Perianth lobes not entire
Stamens inserted at the base of the perianth	Stamens inserted on the perianth tube, or forming a staminal tube
Stamens 9	Stamens 6 or 3

The subsection Chorizanthella (section Suffrutices) is considered very close to the South American perennials, and does, indeed, contain the South American annuals. *Chorizanthe brevicornu* and *C. spathulata*, North American members of subsection Chorizanthella, are separable from the austral perennials only in the annual habit and reduced number of stamens—the latter character not characterizing their subsection, however.

The ancestor of section Herbaceae is probably to be considered as an intermediate extinct group between the Perennes and Herbaceae, rather than in the Chorizanthella series. Figure 3 illustrates the probable relationship of the several subsections.

The subsection Pungentes is considered relatively primitive in the section because of the morphology of the flower. The lobes of the flower are entire and subequal, and the stamens are inserted at the base of the perianth. The large, foliaceous bracts, the compound uniparous cymes, and the margined involucres are thought to indicate, on the other hand, advanced characters.

Of the Herbaceae which do not possess involucral margins the subsection Staticoideae is considered the most primitive. The involucral teeth are always six, as they are in the entire section Herbaceae except part of subsection Flavae. The perianth lobes are prevailingly entire but of two different sizes. In the Uniaristatae the inner perianth lobes are fimbriate or

at least erose, and the anterior involucral tooth is unusually long. The relationship of the members of this subsection is depicted in fig. 4.

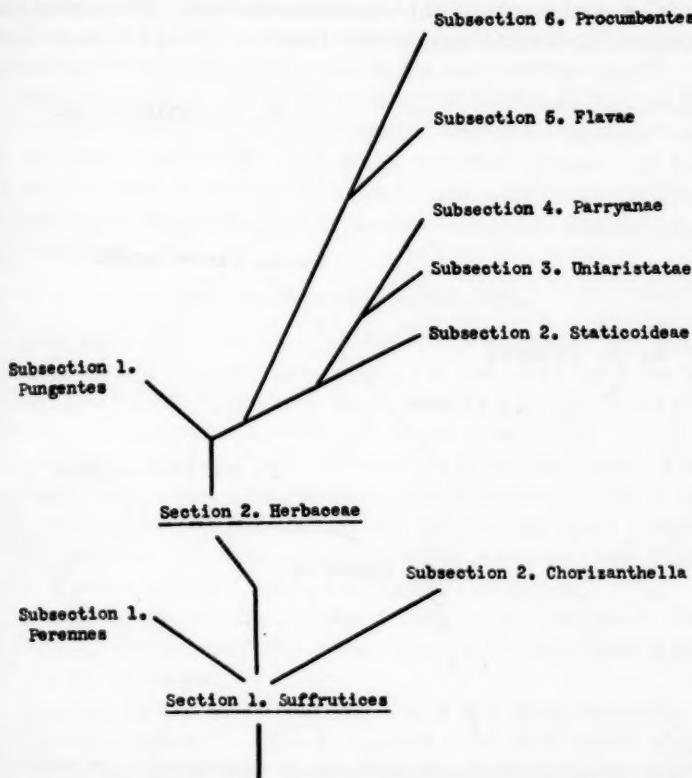


Fig. 3. Diagram illustrating the probable phylogeny of the genus *Chorizanthe*.

Subsection *Flavae* is considered advanced because of the obsolete inner involucral teeth of two of the three species, and because of the reduced condition of the uniparous cymes. Certain less important characters of this group call to mind the last subsection, the *Procumbentes*. This terminal group is

considered the most advanced chiefly because of the presence of the staminal tube, which is constant in the group.

THE SPECIFIC AND SUBSPECIFIC CONCEPTS

A few statements might be made concerning the specific and subspecific concepts used in this treatise. Two kinds of char-

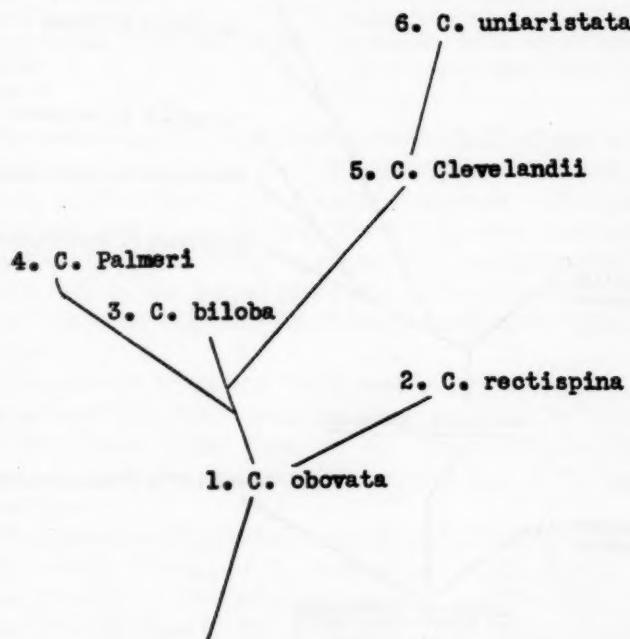


Fig. 4. Diagram depicting the relationship of the members of the subsection *Uniaristatae*.

acteristics have been considered which are popular among present-day taxonomists, namely, the morphologic characters and the geographic distribution. As a working basis, at least two morphologic characters have been considered necessary to differentiate a species from its morphologically nearest relative. In all instances, species delimited in this way have been

found to possess a geographic range largely or quite different from that of the morphologically nearest relative.

Varieties have been established on a minimum of one constantly different character, providing the geographic range is not intermittent through the range of the parent species. More than one morphologic character has been considered necessary when the distribution is sporadic in the range of the species.

There is nothing new in this method of delimitation, and the course followed, it is thought, is neither that of a "splitter" nor a "lumper," but rather, it is an intermediate course. It was chosen because it seemed to incorporate best those qualities which are so desirable to taxonomists—namely, accuracy and convenience.

THE GEOGRAPHIC DISTRIBUTION

Both the North and South American members of the genus inhabit xerophytic habitats which, for the most part, lie between the Pacific Coast and the first ranges to the eastward. The South American species are found west of the Andes in the northern part of Chili. Subsection Chorizanthella, of the section Suffrutices, contains the South American annuals and the most widely distributed of the North American species. This subsection is represented in North America from Idaho and Washington to Arizona and Lower California.

All of the section Herbaceae is native to California and Lower California, and very rarely extends its distribution east of the coast ranges.

Each subsection is quite as much of a unit geographically as it is morphologically. The Pungentes have their center of distribution in Santa Cruz County, and at present no species is known from north of Mendocino County or south of Santa Barbara County, unless it be *C. angustifolia* Nutt., the type of which is said to have been collected at "Pueblo de los Angeles." In the light of subsequent collections, it is difficult to believe that the data are correct.

The Staticoideae have their center of distribution in Los Angeles County, and species are found north to Monterey County and south to Lower California. The two inland species

of the *Herbaceae* belong to this group—*C. Xanti* inhabiting the San Joaquin Valley, and *C. laciniata* being found in the eastern half of San Diego County and in western Imperial County. One species of this group, *C. Wheeleri*, is almost endemic to the Santa Barbara Islands.

The *Uniaristatae* have as their center of distribution San Luis Obispo County, while subsections *Parryanae* and *Pro-cumbentes* range from Los Angeles County into Lower California. The subsection *Flavae* is confined to Lower California.

ACKNOWLEDGMENTS

The author is deeply indebted to numerous people whose aid and advice have been invaluable in the present study. For the privileges incident to studying at the Missouri Botanical Garden, the writer expresses his thanks to Dr. G. T. Moore, Director of that institution. Appreciation is due also to Miss Nell Horner, Librarian, for aid in assembling the bibliographic data. Most primarily are thanks due to Dr. J. M. Greenman, who has so generously given of his time in wisely and critically guiding the entire study.

Entire or partial collections of *Chorizanthe* have been borrowed from several herbaria, and certain herbaria have been visited, that the specimens of the genus might be examined. To those in charge of these collections, acknowledgments of gratitude are hereby made. The herbaria are the following:

- CAS = Herbarium of the California Academy of Sciences.
CU = Herbarium of Columbia University.
D = Dudley Herbarium of Leland Stanford, Jr. University.
E = Herbarium of J. A. Ewan, Los Angeles.
F = Herbarium of the Field Museum of Natural History.
G = Gray Herbarium of Harvard University.
ISC = Herbarium of Iowa State College.
K = Herbarium of the Royal Botanic Gardens, Kew.
M = Herbarium of the Missouri Botanical Garden.
Par = Parry Herbarium of Iowa State College.
Pe = Herbarium of F. W. Peirson.

Ph = Herbarium of the Academy of Natural Sciences, Philadelphia.

Pom = Herbarium of Pomona College.

RMt = Rocky Mountain Herbarium, University of Wyoming.

UC = Herbarium of the University of California.

US = United States National Herbarium.

Preceding the name of each herbarium is its abbreviation as used in the taxonomic portion of this study.

TAXONOMY

Chorizanthe R. Br. ex Benth. Trans. Linn. Soc. Lond. **17**: 416. 1836; Spach, Veg. Phan. **10**: 521. 1841; Meisn. Pl. Vasc. Gen. **1**: 317; **2**: 229. 1836-1843; Benth. in DC. Prodr. **14**: 24. 1857; Torr. & Gray, Proc. Am. Acad. **8**: 192. 1870; Wats. U. S. Geol. Surv. Fortieth Parallel [Bot. King's Exp.] **5**: 484. 1871; Wats. Proc. Am. Acad. **12**: 269. 1877; Benth. & Hook. Gen. Pl. **3**: 93. 1880; Wats. Botany [of California] **2**: 33. 1880; F. Philippi, Cat. Pl. Vasc. Chil. 253. 1881; Parry, Proc. Davenp. Acad. Sci. **4**: 45. 1884; Behr, Fl. Vicinity San Francis. 277. 1888; Dammer in Engl. & Prantl, Nat. Pflanzenfam. **3^{1a}**: 11. 1891; Greene, Fl. Francis. 153. 1891; Baillon, Hist. d. Pl. **11**: 399. 1892; Greene, Man. Bot. Reg. San Francis. Bay, 48. 1894; Heller, Cat. N. Am. Pl. 41. 1898; Jepson, Fl. West. Mid. Calif. 149. 1901, and ed. 2. 129. 1911; Howell, Fl. N. W. Am. 575. 1902; Abrams, Fl. Los Angeles & Vicinity, 112. 1904, and ed. 2. 103. 1917; Piper, Contr. U. S. Nat. Herb. [Fl. Wash.] **11**: 239. 1906; Jepson, Fl. Calif. 389. 1914; Rydberg, Fl. Rocky Mts. 229. 1917, and ed. 2. 229. 1922; Davidson & Moxley, Fl. So. Calif. 112. 1923; Jepson, Man. Fl. Pl. Calif. 295. 1923; Tidestrom, Contr. U. S. Nat. Herb. [Fl. Utah & Nev.] **25**: 144. 1925.

Trigonocarpus Bertero ex Steudel, Nom. ed. 2, **2**: 710, 1841, according to Hooker f. & Jackson, Ind. Kew. **2**: 1118. 1895, and de Dalle Torre & Harms, Gen. Siphon. 139. 1900-1907, not *Trigonocarpus* Vell. Fl. Flum. 153. 1825, and 145. 1881, nor of Wall.

Lastarriaea Remy in Gay, Fl. Chili 5: 289. 1849; Meisn. in DC. Prodr. 14: 186. 1857; Torr. & Gray, Proc. Am. Acad. 8: 199. 1870; Wats. U. S. Geol. Surv. Fortieth Parallel [Bot. King's Exp.] 5: 477. 1871; Benth. & Hook. Gen. Pl. 3: 94. 1880; Wats. Botany [of California] 2: 39. 1880; Parry, Proc. Davenp. Acad. Sci. 5: 35. 1887; Behr, Fl. Vicinity San Francis. 278. 1888; Dammer in Engl. & Prantl, Nat. Pflanzenfam. 3^{1a}: 10. 1891; Greene, Fl. Francis. 159. 1891; Heller, Cat. N. Am. Pl. 43. 1898; Jepson, Fl. West. Mid. Calif. 149. 1901, and ed. 2. 128. 1911; Abrams, Fl. Los Angeles & Vicinity, 112. 1904, and ed. 2. 103. 1917; Jepson, Fl. Calif. 389. 1914; Davidson & Moxley, Fl. So. Calif. 105. 1923; Jepson, Man. Fl. Pl. Calif. 294. 1923.

Hamaria Kunze, as to *Lastarriaea*, in Baillon, Hist. d. Pl. 11: 397. 1892.

Fruticose or suffruticose perennials or herbaceous annuals, softly pubescent to tomentose. Stems erect to prostrate, dichotomously, or less frequently trichotomously, branched. Leaves basal, or caudine and alternate, entire, sometimes sheathing. Inflorescence of spreading, capitate, or uniparous cymes. Bracts foliaceous to subulate, opposite or, less frequently, whorled, entire. Involucres sessile at the forks of the branches, or rarely lacking, tube circular to triangular in cross-section, 3-6-ribbed, terminated by 6, or less frequently 3 (rarely 5), spines or teeth, these usually uncinate and spreading. Flowers solitary, commonly sessile or nearly so, included in the involucre or partially exserted, bractlets lacking; perianth frequently inconspicuously short-villous on the outer surface, 6-lobed (very rarely 5-lobed) or cleft, never parted, the lobes similar, or in two unequal sets of 3 each, entire or not. Stamens usually 9 (or 6 or 3), inserted at base of the perianth or, less frequently, on the tube, or united by the filaments into a short ciliate staminal tube, usually included; filaments glabrous; anthers orbicular to linear, 2-celled, longitudinally dehiscent. Achene 3-carpellate, 3-angled, glabrous; styles 3, stigmas capitate; ovule orthotropous, cotyledons linear and straight or nearly so.

Type species: *Chorizanthe virgata* Benth. Trans. Linn. Soc. Lond. 17: 416, pl. 19, fig. 1. 1836.

ARTIFICIAL KEY TO THE SPECIES AND VARIETIES

- A. Involucres present.
- B. Involucral teeth 6.
- C. Involucral teeth not scarious-margined.
 - D. Anterior tooth usually shorter than the involucral tube, or if as long or longer, sharing this character with the other two teeth of the outer trio.
 - E. All the perianth lobes entire or very nearly so.
 - F. Perianth lobes similar or subsimilar.
 - G. Involucral tube, as well as the perianth, 2–4 mm. long.
 - H. Plants procumbent to ascending.
 - I. Involucral teeth uncinate.
 - J. Plants gray-pubescent.
 - K. Outer involucral teeth of slender spines. Plants of Santa Barbara County and northward.
 - L. Perianth scarcely exceeding the involucre, lobes not apiculate. Plants of San Luis Obispo and Santa Barbara Counties.
 - M. Flowers 2.5–3 mm. long, stamens 7–9.
 -10a. *C. angustifolia* var. *Eastwoodae*
 - MM. Flowers 2–2.5 mm. long, stamens 3.
 -10. *C. angustifolia*
 - LL. Perianth definitely exceeding the involucre, lobes apiculate. Plants from vicinity of San Francisco Bay.
 -9. *C. cuspidata*
 - KK. Outer involucral teeth stout. Plants of Lower California.
 -40. *C. chaetophora*
 - JJ. Plants greenish-yellow.
 - N. Perianth lobes broadly elliptic-ovate to elliptic oblong.
 - O. Outer involucral teeth stout, spinose portion very short.
 -39. *C. Jonesiana*
 - OO. Outer involucral teeth of slender spines.
 -38b. *C. procumbens* var. *mexicana*
 - NN. Perianth lobes, at least the outer, oblong.
 - P. Flowers yellow.
 -38. *C. procumbens*
 - PP. Flowers white.
 -38a. *C. procumbens* var. *albiflora*
 - II. Involucral teeth straight.
 - HH. Plants erect.
 - Q. Leaves oblanceolate.
 -1. *C. brevicornu*
 - QQ. Leaves spatulate.
 -2. *C. spathulata*
 - GG. Involucral tube 5 mm. long, flower 6–7 mm. long.

- R. Inner teeth evident..... *35. C. mutabilis*
- RR. Inner teeth obsolete..... *36. C. flava*
- FF. Perianth lobes dissimilar.
 - S. Involucral teeth uncinate, or at least down-curved.
 - T. Plants without foliaceous bracts, or at least these not long persisting.
 - U. Perianth 4 mm. or less long.
 - V. Lobes oblong to narrowly elliptic.
 - W. Plants 3 dm. or less tall, leaves 7 cm. or less long.
 - X. At least 5 of the teeth consisting of scarcely more than a short uncinate spine..... *18b. C. staticoides* var. *brevispina*
 - XX. Teeth longer, all tapering from a broadened base..... *18. C. staticoides*
 - WW. Plants over 3 dm. tall, leaves 8–10 cm. long..... *18c. C. staticoides* var. *elata*
 - VV. Lobes, at least the outer, obovate.
 - Y. Involucral tube about 3 mm. long, teeth long and slender. Plants from vicinity of San Diego..... *22. C. discolor*
 - YY. Involucral tube more than 3 mm. long, teeth shorter than in the preceding species. Plants of Los Angeles County..... *18d. C. staticoides* var. *latiloba*
 - UU. Perianth 4.5–5.5 mm. long.
 - Z. Involucres in large, dense clusters, perianth 5–5.5 mm. long.
 - a. Plants not densely branched..... *19. C. chrysacantha*
 - aa. Plants densely branched..... *19a. C. chrysacantha* var. *compacta*
 - ZZ. Involucres very slender, disposed in small, loose clusters; perianth 4.5 mm. long..... *21. C. leptotheca*
 - TT. Plants with foliaceous bracts.
 - b. Perianths 4 mm. or less long. Plants coastal.
 - c. Bracts lanceolate.
 - d. Involucres closely aggregated in flat-topped cymes..... *18a. C. staticoides* f. *bracteata*
 - dd. Involucres not closely aggregated in flat-topped cymes.
 - e. Clusters of involucres dense, spherical, 1–1.5 cm. broad. Plants chiefly of Santa Barbara Islands..... *24. C. Wheeleri*
 - ee. Clusters of involucres less than 1 cm. broad. Plants of Los Angeles and southwestern San Bernardino Counties and southward..... *33. C. Parryi*
 - ee. Bracts, at least some of them, ovate to orbicular..... *23. C. Brewerii*

- bb. Perianths 5–6 mm. long. Plants from east of the coast ranges.
 - f. Involucres not white-tomentose..... 20. *C. Xanti*
 - ff. Involucres white-tomentose..... 20a. *C. Xanti* var. *leuotheca*
- SS. Involucral teeth straight.
 - g. Outer teeth 4 mm. or more long. Plants from the region of northern Lower California..... 34. *C. inequalis*
 - gg. Outer teeth shorter. Plants of Los Angeles and Orange Counties..... 33a. *C. Parryi* var. *fernandina*
- EE. All the perianth lobes not entire.
 - h. Outer lobes of perianth entire or bilobed, the inner fimbriate.
 - i. The outer lobes entire.
 - j. Outer lobes obovate, inner oblong.
 - k. Plants erect..... 27. *C. obovata*
 - kk. Plants prostrate..... 27a. *C. obovata* f. *prostrata*
 - jj. Outer lobes orbicular, inner retuse to emarginate..... 30. *C. Palmeri*
 - ii. The outer lobes bilobed..... 29. *C. biloba*
 - hh. Outer and inner lobes erose or fimbriate.
 - l. All the lobes fimbriate.
 - m. Inner teeth evident.
 - n. Perianth 5.5–7 mm. long, terminal portion of lobes linear-oblong. Plants of west half of San Diego County and adjacent country to northward and southward..... 25. *C. fimbriata*
 - nn. Perianth 7–9 mm. long, terminal portion of lobe scarcely longer than the fimbriations. Plants of east half of San Diego County and adjacent country to north, east and south..... 26. *C. laciniata*
 - mm. Inner teeth almost obsolete..... 37. *C. pulchella*
 - ll. All the lobes more or less erose.
 - o. Involucral teeth straight..... 15. *C. valida*
 - oo. Involucral teeth uncinate..... 33. *C. Parryi*
 - DD. Anterior involucral tooth as long as or longer than the tube, the other 5 teeth short.
 - p. The long tooth straight.
 - q. Flowers partly exserted, the outer lobes obovate, truncate, stamens 9..... 28. *C. rectispina*
 - qq. Flowers included or nearly so, stamens 3..... 32. *C. uniaristata*
 - pp. The long tooth uncinate..... 31. *C. Clevelandii*
 - CC. Involucral teeth scarious-margined.
 - r. Margins parted or divided at the sinuses.
 - s. Involucral teeth uncinate or recurved.
 - t. Foliaceous bracts present.
 - u. Involucres 4 mm. or less long, diffuse plants.
 - v. Lobes obovate to oblong, erose.

- w. Margins of involucres light-colored. Plants of vicinity of Monterey Bay..... *S. C. pungens*
- ww. Margins of involucres purple. Plants chiefly of Santa Cruz County..... *8a. C. pungens* var. *Hartwegi*
- vv. Lobes not obovate to oblong, nor erose.
- x. Perianth lobes oblong, entire, cuspidate.
- y. Margins of involucre obsolete..... *9. C. cuspidata*
- yy. Margins of involucre evident and purplish.....
..... *9a. C. cuspidata* var. *marginata*
- xx. Perianth lobes oblong, lanceolate, entire..... *11. C. diffusa*
- uu. Involucres more than 4 mm. long, erect plants.
- z. Involucres hispid, margins white and evident..... *17. C. stellulata*
- zz. Involucres hirsute, margins not white..... *14. C. robusta*
- tt. Foliarious bracts mostly lacking..... *11. C. diffusa*
- ss. Involucral teeth straight.
 - 1. Plants erect; involucres, as well as the flowers, 5-6 mm. long...
..... *15. C. valida*
 - 1'. Plants diffuse, flowers 4 mm. long..... *12. C. Howellii*
- rr. Margins continuous through the sinuses.
 - 2. Margins scarcely lobed, never cleft, purple..... *16. C. Douglassii*
 - 2'. Margins cleft, white..... *17. C. stellulata*
- BB. Involucral teeth fewer than 6.
 - 3. Involucral teeth 3.
 - 4. Perianth 4 mm. or less long.
 - 5. Involucres triangular in cross-section.
 - 6. Bracts opposite. Plants from Pt. Loma, San Diego County..
..... *4. C. Orcuttiana*
 - 6'. Bracts verticillate. Plants from Lower California.....
..... *6. C. interposita*
 - 5'. Involucres cylindric..... *5. C. corrugata*
 - 4'. Perianth 6 mm. or more long.
 - 7. Lobes entire..... *36. C. flava*
 - 7'. Lobes fimbriate..... *37. C. pulchella*
 - 3'. Involucral teeth 5 (one larger than the others and frequently foliaceous)..... *3. C. Watsonii*
- AA. Involucres lacking..... *7. C. Lastarriaea* var. *californica*

Section 1. SUFFRUTICES Benth. Perennials, or if annuals, with the characters as given under subsection 2. Chorizanthes.

Subsection 1. PERENNES, new subsection. South American perennials, represented by such species as *C. virgata* Benth., *C. glabrescens* Benth. (pl. 1, figs. 1 and 2), and *C. frankeniodes* Remy. The subsection not here treated. The morphology of the involucres and flowers is similar to that of *C. brevicornu* of the next subsection.

Subsection 2. *CHORIZANTHELLA* Parry, emend. Erect or less frequently prostrate plants; stems several from the base, leaves basal, and the lower bracts foliaceous. Involucral teeth 6 and short, or 3, or rarely 5. Flowers frequently pedicellate. Perianth 2–4 mm. long, the lobes similar, entire or nearly so. Stamens frequently inserted well up on the perianth tube. Cotyledons longer than the radicle. Species 1–7 incl.

Range: Idaho and Washington, south to Arizona and Lower California; also in South America.

C. commissuralis Remy, a South American annual species closely related to *C. brevicornu*, and also the South American representatives of the former genus *Lastarriaea* belong to this subsection. The species with the largest distribution of the North American group also belong here.

1. *Chorizanthe brevicornu* Torr. Bot. Mex. Bound. 2: 177. 1859; Torr. & Gray, Proc. Am. Acad. 8: 196. 1870, excluding Watson's collection; Wats. U. S. Geol. Surv. Fortieth Parallel (Bot. King's Exp.) 5: 312, 484. 1871, excluding plants with "leaves . . . spathulate-obovate," Watson 1044, and p. 484, "leaves . . . obovate-spathulate"; Wats. Proc. Am. Acad. 12: 272. 1877, excluding plants with "leaves . . . broadly spathulate"; Wats. Botany [of California] 2: 38, 481. 1880, excluding plants with "leaves broadly spathulate"; Hemsley, Biol. Cent.-Am. Bot. 3: 33. 1882, including citation of Parry plant from Arizona; Parry, Proc. Davenp. Acad. Sci. 4: 62. 1884; Jepson, Fl. Calif. 393, fig. 68. 1914; Rydb. Fl. Rocky Mts. 229. 1917, and ed. 2. 229. 1922; Davidson & Moxley, Fl. So. Calif. 113. 1923; Jepson, Man. Fl. Pl. Calif. 297, fig. 319. 1923; Tidestrom, Contr. U. S. Nat. Herb. [Fl. Utah & Nev.] 25: 145. 1925, excluding synonymy.

Erect plants, 1–2 dm. tall, pubescent to pulverulent or glabrate, extremely fragile at the nodes when mature; branches ascending; leaves oblanceolate, frequently narrowly so, 3–6 cm. long; foliaceous bracts narrowly lanceolate to oblanceolate, apiculate, upper reduced, all opposite; involucres appearing singly in the axils of the branches of the cyme, narrowly subcylindric, curved, 4 mm. long, teeth 6, short, nearly equal, all

uncinate; flowers short-pedicellate, usually included, 3–4 mm. long, glabrous, perianth tubes cylindric, slender, lobes similar, linear-oblong to lanceolate, nearly 1 mm. long; stamens 3, inserted at base of perianth opposite the inner segments, anthers small and suborbicular; achenes sometimes a little exserted from perianth, somewhat curved, cotyledons very slightly incurvately curved at tips.

Type: on the Gila River, March, *Parry*.

Distribution: southern and western Arizona, southwestern Utah, western Nevada, and Mono County, California, southward to the Lower California boundary.

Specimens examined:

ARIZONA: valley of Gila, October, 1871, *Mohr* (US); 1880, *Lemmon* (M); 1881, *Lemmon* (M, Par); mesa near Tucson, April 28, 1883, *Pringle* (M, Ph, US); Ft. Mojave, April, 1884, *Lemmon & wife* (US); Tucson, May 24, 1892, *Toumey* 469b (US); gravel, Beaverdam, alt. 1800 ft., April 5, 1894, *Jones* 5024av (Pom, US); Tucson Mts., March 13–April 23, 1903, *Griffiths* 3486 (M, US); Oracle to Redington, March 13–April 23, 1903, *Griffiths* 3722 (M, US); Coyote to Santa Rosa, March 13–April 23, 1903, *Griffiths* 3981 (M, US); Coyote to Santa Rosa, March 13–April 23, 1903, *Griffiths* 3991 (US); Franconia, alt. 900 ft., April 17, 1903, *Jones* (Pom); Congress Junction, alt. 3000 ft., May 2, 1903, *Jones* (Pom); Wickensburg, alt. 2100 ft., May 5, 1903, *Jones* (Pom); Phoenix, alt. 1000 ft., May 6, 1903, *Jones* (Pom); Santa Rita Forest Reserve, May 20–22, 1903, *Griffiths* 4395 (M, US); north end Tucson Mts., April 22, 1903, *Rose* 11870 (US); Santa Rita Range Reserve, May 11, 1912, *Wooton* (US); Phoenix, April 18, 1917, *Eastwood* 6165 (CAS); Tucson, March 21, 1919, *Eastwood* 8071 (CAS); Roosevelt Dam, May 17, 1919, *Eastwood* 8667 (CAS); Topock, May 24, 1919, *Eastwood* 8910 (CAS); Mormon Flats, March 7, 1926, *Peebles & Loomis* 1033 (US); near Dome, March 6, 1927, *Harrison* 3619 (US); Buck Mts., south of Yucca, April, 1928, *Braem* (D); Sierra Ancha, May 7, 1929, *Eastwood* 16988 (CAS); Sacaton Mts., March 27, 1930, *Peebles* 6532 (US); Oatman, April 21, 1931, *Eastwood* 18188 (CAS).

UTAH: rocky slopes near St. George, 1874, *Parry* (M, Ph); 1876, *Johnson* (US); red sand, St. George, alt. 3000 ft., April 26, 1894, *Jones* 5110al (Pom, US); volcanic hillsides, Diamond Valley, May 19, 1902, *Goodding* 881 (M, RMt, US).

NEVADA: Hawthorn, 1882, *Jones* (Par); near Hole in the Rock, alt. 1500 ft., April 13, 1894, *Jones* 5036ap (US); Mica Spring, alt. 4000 ft., April 13, 1894, *Jones* 5045ao (US); Amargosa Desert, alt. 3000 ft., April 26, 1907, *Jones* (Pom); Logan, May 5, 1909, *Kennedy* 1851 (D, Ph); Indian Spring, May 5, 1909, *Kennedy* 1851 (US); Rhyolite, alt. 3575 ft., May 17, 1909, *Heller* 9680 (ISC).

CALIFORNIA: SANTA CRUZ COUNTY—Santa Cruz, June 29, 1881, *Jones* (Pom, US); MONO COUNTY—volcanic tableland, June 25, 1925, *Pearson* 6037 (Pe); INYO COUNTY—Darwin, alt. 4600 ft., April 27, 1897, *Jones* (Pom); Panamint Cañon, alt. 2000 ft., May 3, 1897, *Jones* (D, Pom); rocky hills, Argus Mts., alt. 3000–4000 ft., April–September, 1897, *Purpus* 5318 (M, US); Funeral Mts., Death Valley, alt. 2000 ft., April 9, 1907, *Jones* (Pom); Surprise Cañon, May 12, 1915, *Parish*

10102 (D); wash of Wild Rose Cañon, Panamint Mts., alt. 2000 ft., March 20, 1924, *Ferris* 3948 (D); between Shoshone and Silver Lake, June 14, 1930, *Ferris* 8007 (D, M); KERN COUNTY—on rocky hillside south of Mojave, May 5, 1920, *Johnston* (Pom); sandy flat, Muroc, May 20, 1929, *Hoffmann* (E); alluvial slopes, Red Rock Canyon, May 13, 1930, *Howell* 4969 (CAS); Red Rock Canyon, May 13, 1930, *Peterson* 8205 (Pe); SAN BERNARDINO COUNTY—Mojave River, May 23, 1876, *Palmer* 469 (M); Mojave River, June 1, 1876, *Palmer* 469 (M, US); Needles, May, 1884, *Jones* (US); Rabbit Spring, Mojave Desert, May-June, 1901, *Parish* 4864 (D); Palm Springs, April 30, 1913, *Eastwood* 3061 (CAS); Barstow, May 30, 1914, *Parish* 9274 (D); Baxter, May 23, 1915, *Parish* 9876 (D); dry, rocky hill, Barstow, April 13, 1919, *Munz* 2601 (D, Pom); sandy wash, near Needles, alt. 700 ft., March 31, 1920, *Munz & Harwood* 3618 (Pom); dry, sandy plain, near Warren's Well, alt. 3200 ft., May 6, 1922, *Munz & Johnston* 5175 (Pom); between Barstow and Victorville, May 14, 1922, *Hart* 78 (CAS); Salt Wells Canyon, March 20, 1924, *Ferris* 3922a (D); Barstow to Granite Wells, April 25, 1927, *Hart* (CAS); sandy soil, near Deadman's Point, alt. 3000 ft., July 9, 1927, *Howell* 2678 (CAS); 39 miles from Needles, April 24, 1928, *Ferris* 7222 (D); near Valley Wells, Trona, April 18, 1931, *Mathias* 806 (M); Needles, April 23, 1931, *Eastwood* 18246 (CAS); between Victorville and Lucerne Valley, April 30, 1932, *Eastwood* 18803 (CAS); RIVERSIDE COUNTY—near Palm Springs, March, 1903, *Saunders* (Ph); Palm Springs, alt. 200 ft., May 10, 1903, *Jones* (Pom); Whitewater, alt. 1000 ft., May 11, 1903, *Jones* (Pom); near Pinto Mts., May, 1905, *Hall* 6029 (D); Palm Springs, April 20, 1906, *Grant* 6715 (D); Indio, April 27, 1906, *Jones* (Pom); south of Palm Springs, April 24, 1911, *Schellenger* (D, US); sandy soil, near Palm Springs, April 4-6, 1917, *Johnston* (Pom); sandy soil, near Palm Springs, April 4-6, 1917, *Johnston* 1105 (D, Ph); Palm Springs, alt. 525 ft., April, 1920, *Jaeger* 214 (US); sandy desert, near Palm Springs, alt. 500 ft., April 4, 1920, *Munz & Harwood* 3517 (Pom); in desert sand, Mecca, 197 ft. below sea-level, March 16, 1921, *Spencer* (Pom); in sandy wash, Corn Springs, March 25, 1921, *Jaeger* (Pom); vicinity of Corn Springs, Chuckwalla Mts., alt. 1500 ft., April 9-12, 1922, *Munz & Keck* 4859 (Pom); Palm Springs, March 26, 1926, *Abrams* 11016 (D); Palm Springs to Palm Canyon, March 26, 1926, *Abrams* 11060 (D); Palm Springs, April 20, 1926, *Beller* (M); Indio, June 1926, *Clark* (CAS); sandy soil, near Palm Springs, March 25, 1928, *Howell* 3555 (CAS); stony east slope, Thousand Palms Canyon, March 13, 1932, *Fosberg* 8066 (B); SAN DIEGO COUNTY—Mountain Springs, June, 1880, *Vasey* 541 (US); near Agua Caliente, April, 1882, *Parish Bros.* 828 (D); Colorado Desert, April, 1889, *Orcutt* (M, US); Mountain Spring, alt. 2500 ft., May 12, 1894, *Schoenfeldt* 3076 (US); Mountain Spring, May 13, 1894, *Mearns* 3145 (US); Signal Mt., April 2, 1903, *Abrams* 5169 (D, M, Ph, Pom); San Felipe Creek, April 14, 1913, *Eastwood* 2708 (CAS, US); in desert sand, Mountain Springs, alt. 2260 ft., May 3, 1918, *Spencer* 802 (Pom); San Felipe Wash, near Banner, alt. 3000 ft., May 17, 1925, *Keck & McCully* 88 (Pom); near Palm Wash, March 24, 1928, *Howell* 3518 (CAS); IMPERIAL COUNTY—28 miles south of Coachella, April 12, 1922, *Peterson* 4213 (Pe); in wash, near Picacho, April 20, 1928, *Ferris* 7138 (D).

The slight arcuate curve mentioned in the description is manifest in many of the involucres. This character, together with the lax inflorescence and extreme brittleness of the nodes,

makes this and the next species readily recognizable from the rest of the genus.

C. brevicornu has next to the largest range of any of the Chorizanthes here considered. The species is prevailingly greenish, even in age.

2. *Chorizanthe spathulata* Small ex. Rydb. Bull. Torr. Bot. Club 39: 309. 1912; Rydb. Fl. Rocky Mts. 229. 1917, and ed. 2. 229. 1922; Tidestrom, Contr. U. S. Nat. Herb. [Fl. Utah & Nev.] 25: 145. 1925, in synonymy.

Chorizanthe brevicornu Torr. & Gray, Proc. Am. Acad. 8: 196. 1870, as to Watson's collection; Wats. U. S. Geol. Surv. Fortieth Parallel [Bot. King's Exp.] 5: 312, 484. 1871, as to "leaves . . . spathulate-obovate," and Watson 1044, and p. 484, as to plants with "leaves . . . obovate-spathulate"; Wats. Proc. Am. Acad. 12: 272. 1877, as to plants with "leaves . . . broadly spathulate"; Wats. Botany [of California] 2: 38. 1880, as to plants with "leaves broadly spathulate."

Erect plants, 1-1.5 dm. tall, pubescent, reddish at maturity; branches ascending; leaves broadly spathulate, tapered to a winged petiole, 2-5 cm. long; bracts opposite, lower subfoliaceous and small, upper acerose; involucres solitary in the axils of the cymes, subcylindric, curved, 4-5 mm. long; flowers as in *C. brevicornu*.

Type: Big Butte Station, Idaho, June 23, 1893, Palmer 230 (CU).

Distribution: Idaho, western Nevada, and part of adjacent California.

Specimens examined:

IDAHO: Shoshone, June 10, 1893, Palmer 129 (US); Big Butte Station, June 23, 1893, Palmer 230 (CU TYPE, M photograph, US); Murphy, Owyhee County, alt. 4000 ft., July 4, 1911, Macbride 1033 (D, M, Pom, RMt, US); on black lava overflows, Shoshone, Lincoln County, July 18, 1911, Nelson & Macbride 1171 (D, M, RMt); crevices in lava rocks, Picabo, Blaine County, alt. 4900 ft., July 3, 1916, Macbride & Payson 3024 (CAS, D, Pom, RMt, US); Bruneau, June 23, 1930, Jones 25782 (Pom).

NEVADA: Big Bend of the Truckee, alt. 4000 ft., May, 1868, Watson 1044 (CU, US); Hawthorn, June 23, 1882, Jones (D, Pom); probably Tonopah, 1907, Shockley (D).

CALIFORNIA: MONO COUNTY—Green Creek, August 16, 1906, Eastwood (CAS); in sagebrush . . . Walker Creek, June 27, 1923, Ferris 3728 (D); Mono Lake,

August, 1923, Michaels (CAS); dry slopes about Whiskey Creek, Owens River, alt. 6700 ft., July 29, 1933, Peirson 10739 (M, Pe); INYO COUNTY—Bishop Creek, alt. 5000 ft., June 1, 1906, Hall & Chandler 7262 (Pom); Andrews Camp, Bishop Creek, July, 1911, Davidson 2737 (D); sandy soil, Surprise Cañon, Panamint Mts., alt. 5000 ft., June 16, 1928, Howell 3982 (CAS); Westegard Pass, alt. 5000 ft., July 10, 1930, Hoffmann (CAS, E); gravelly flat, Wild Rose Canyon, Panamint Mts., June 20, 1931, Hoffmann 458 (CAS).

The spathulate leaves of this species separate it very well from its nearest relative, *C. brevicornu*. These leaves, however, in which such a good diagnostic character is to be found, are frequently lacking in the older specimens. Nevertheless, the species can still be recognized by the red color of the stems and involucres of the older plants, the broader involucres, as compared with *C. brevicornu*, and the geographic distribution.

3. **Chorizanthe Watsoni** Torr. & Gray, Proc. Am. Acad. 8: 199. 1870; Wats. U. S. Geol. Surv. Fortieth Parallel [Bot. King's Exp.] 5: 313, pl. 34, figs. 4-6, and 485. 1871; Wats. Proc. Am. Acad. 12: 273. 1877; Wats. Botany [of California] 2: 39, 481. 1880; Parry, Proc. Davenp. Acad. Sci. 4: 54. 1884; Dammer in Engl. & Prantl, Nat. Pflanzenfam. 3^{1a}: 11. 1891; Howell, Fl. N. W. Am. 576. 1902; Piper, Contr. U. S. Nat. Herb. [Fl. Wash.] 11: 239. 1906; Jepson, Fl. Calif. 397. 1914; Rydb. Fl. Rocky Mts. 229. 1917, and ed. 2. 229. 1922; Davidson & Moxley, Fl. So. Calif. 113. 1923; Jepson, Man. Fl. Pl. Calif. 299. 1923; Tidestrom, Contr. U. S. Nat. Herb. [Fl. Utah & Nev.] 25: 145. 1925.

Erect to ascending plants, about 1 dm. tall; stems considerably branched, canescent, green or reddish; leaves petiolate, oblanceolate, 2-3 cm. long, tomentose beneath, lanate above; bracts opposite, lower frequently similar to the leaves or narrower, upper acerose; involucres disposed singly or in small groups in the axils of the lax cyme, involucral tube cylindric, inconspicuously 5-ribbed, 3-4 mm. long, canescently ascending pubescent, 5-toothed, the teeth short and recurved to uncinate, except the anterior one—this foliaceous, lanceolate, from but little longer than the short teeth to 15 mm. long, terminated by a recurved awn; flowers included or very slightly exserted, pedicellate, 3-4 mm. long, yellow, perianth tubes cylindric, scantily pubescent, segments oblong, acute, 0.5-1 mm. long,

equal; stamens 9, inserted on the perianth tube just below the lobes, filaments 0.5 mm. long, anthers oval; styles short.

Type: on borders of the desert, Reese River, Nevada, *Humboldt*.

Distribution: western Arizona, southwestern Utah, Nevada, southwestern Idaho, Washington, Oregon, and California.

Specimens examined:

ARIZONA: Chloride, alt. 4500 ft., April 14, 1903, *Jones* (Pom).

IDAHO: Shoshone, June 10, 1893, *Palmer 126* (US); Shoshone, June 10, 1893, *Palmer 128* (CAS, M, Ph, RMt, US); north of Big Camas Prairie, alt. 5000 ft., July 14, 1895, *Henderson 3129* (US); Weiser, alt. 2200 ft., July 7, 1899, *Jones* (Pom); dry sandy slopes, Big Willow, alt. 3000 ft., May 31, 1910, *Macbride 159* (M, RMt, US); Glenn's Ferry, alt. 3000 ft., June 17, 1911, *Jones* (Pom); dry stony slopes, Three Creek, Owyhee County, July 2, 1912, *Nelson & Macbride 1875* (RMt, US); stony hillsides, near Dixie, Elmore County, alt. 4000 ft., June 24, 1916, *Macbride & Payson 2848* (RMt, US).

UTAH: dry hillside, Diamond Valley, Washington County, alt. 4000 ft., June 2, 1929, *Cottam, Stanton & Harrington 4033* (Pom).

NEVADA: Unionville Valley, alt. 4800 ft., June, 1868, *Watson 1046* (US); Humboldt Lake, alt. 4500 ft., May, 1868, *Watson 1046* (US); Pyramid Lake, September, 1874, *Leffman* (US); Shoshone, June 6, 1881, *Jones* (Pom); Elko, June 14, 1882, *Jones* (Pom); Empire City, June 19, 1882, *Jones 2995* (CAS, D, M, Ph, Pom, RMt, US); Dayton, June 21, 1882, *Jones* (Pom); Hawthorn, June 23, 1882, *Jones* (Pom); 1883, *Curran* (M); Alum Creek, Reno, June 30, 1893, *Hulman* (M); Reno, June 22, 1895, *Hillman* (D); Peavine foothills, Reno, June 25, 1895, *Hillman* (Pom); foothills, Reno, alt. 5500 ft., June 14, 1897, *Jones* (M, Pom, US); dry hills, Reno, alt. 5000 ft., June 19, 1900, *Stokes* (D, US); Eagle Valley, Ormsby County, alt. 1446 m., June 15, 1902, *Baker 1093* (M, Pom, US); Palisade, alt. 5000 ft., June 17, 1903, *Stokes* (US); Truckee Pass, Washoe County, alt. 4500 ft., June 14, 1906, *Kennedy 1308* (M, US); Rhyolite, alt. 3600 ft., June 1, 1907, *Shockley 56* (D); Riverside Park, Reno, alt. 4500 ft., May 26, 1909, *Heller 9705* (D, Ph); near Austin, July 26, 1913, *Kennedy 4536* (D); dry hills, near Austin, alt. 1950 m., July 27, 1913, *Hitchcock 764* (US).

WASHINGTON: dry hillsides, Wilson Creek, June, 1893, *Sandberg* (M); Wilson Creek, alt. 2000-3000 ft., June, 1893, *Sandberg & Leiberg* (ISC, Pom); near Wilson Creek, Douglas County, alt. 470 m., June 21, 1893, *Sandberg & Leiberg 258* (US); Pasco, May 25, 1899, *Piper 2980* (US).

OREGON: Union County, 1879, *Cusick 771* (US); dry hills, near Willow Creek, Baker County, June 17, *Cusick 1974* (M, US); base of Stein's Mts., May 30, 1885, *Howell* (CAS, Ph, US); Malheur Valley, near Harper Ranch, alt. 900 m., June 8, 1896, *Leiberg 2225* (CAS); dry ground, near Redmond, June 19, 1925, *Peck 13817* (D); dry sandy ground, near Redmond, June 19, 1925, *Peck 13847* (Ph); dry sandy ground, near Riley, June 22, 1925, *Peck 13847a* (D); dry ground, near Riley, June 22, 1925, *Peck 13852* (D, Ph); dry ground, near Folly Farm, Harney County, June 26, 1925, *Peck 13393* (D); dry gravelly slopes, near Brogan, May 25, 1927, *Henderson 8987* (CAS); dry slopes of Pueblo Mts., July 2, 1927, *Henderson 8989*

(CAS); dry ground, Jordan Valley, Malheur County, July 9, 1927, *Henderson* 8988 (CAS).

CALIFORNIA: LASSEN COUNTY—Chat, alt. 5000 ft., June 18, 1897, *Jones* (Pom); INYO COUNTY—Bishop Creek, alt. 4750 ft., May 31, 1906, *Hall & Chandler* 7247 (Pom); Lone Pine, May 13, 1927, *Jones* (Pom); Westgard Pass, White Mts., alt. 7300 ft., June 27, 1930, *Duran* 517 (CAS, D, M); KERN COUNTY—Mojave, May, 1882, *Pringle* (M, Par, US); Mojave, May 25, 1882, *Pringle* (Ph); Mojave Desert, alt. 950 m., June 26, 1891, *Coville & Funston* 1135 (US); Mojave, alt. 3000 ft., May 20, 1903, *Jones* (Pom); Mojave, May 13, 1913, *Eastwood* 3235 (CAS, US); rocky hillside, near Mojave, May 5, 1920, *Johnston* (Pom); rocky hills between Rosamund and Mojave, April 30, 1927, *Abrams* 11754 (D); El Paso Range, May 1, 1927, *Abrams* 11932a (D); alluvial slopes, Red Rock Canyon, May 13, 1930, *Howell* 4976 (CAS); SAN BERNARDINO COUNTY—Mojave River, June 1, 1876, *Palmer* 470 (M, Ph, US); Cajon Pass, alt. 3800 ft., May 16, 1903, *Jones* (Pom); on shady bench, Cajon Pass, alt. 3500 ft., May 15, 1920, *Johnston* (Pom); open, sandy plain, Deadman's Point, May 16, 1920, *Johnston* (Pom); sandy plain, near Victorville, May 16, 1920, *Johnston* (Pom); near Hesperia, May 17, 1920, *Johnston* (Pom); Hesperia, alt. 3000 ft., May 27, 1922, *Jaeger* (D); Foxesee Creek, alt. 6000 ft., June 25, 1922, *Pearson* 5151 (Pe); sandy soil, Deadman's Point, alt. 3000 ft., June 12, 1927, *Howell* 2518 (CAS); between Deadman's Point and Rabbit Springs, May 24, 1931, *Mathias* 874 (M, Ph); dry field, 7 miles south of Box "S" Ranch, Mohave Desert, alt. 3700 ft., June 9, 1932, *Munz & Hitchcock* 12776 (M); LOS ANGELES COUNTY—near Acton, May 21, 1893, *Hasse* (D); Rock Creek, San Gabriel Mts., alt. 4750 ft., June 16, 1918, *Pearson* 394 (E, Pe); sandy wash, Big Rock Creek, San Gabriel Mts., May 19, 1929, *Hoffmann* (E); SAN DIEGO COUNTY—Agua Caliente, April, 1882, *Parish Bros.* 1201 (D, ISC, M, Par, US); COUNTY NOT KNOWN—1874, *Lemmon* 204 (M, Ph).

This species is unique in the genus in possessing 5 involucral teeth. The foliaceous one is commonly quite as large as the involucre and sometimes much larger. All degrees of variation may occur on the same plant, however, and such plants may occur in any part of the range.

C. Watsoni has the largest area of distribution of any species in the group here treated, and this range is not greatly different from that of its widely distributed relative, *C. brevicornu*.

The faecal insertion of the stamens characterize the remainder of the subsection Chorizanthella.

4. *Chorizanthe Orcuttiana* Parry, Proc. Davenp. Acad. Sci. 4: 54. 1884; Jepson, Fl. Calif. 396. 1914; Davidson & Moxley, Fl. So. Calif. 113. 1923; Jepson, Man. Fl. Pl. Calif. 299. 1923.

Pl. 1, fig. 3.

Spreading plants, about 1 dm. broad; stems appressed or spreading pubescent with rather straight hairs; leaves petiolate, narrowly oblanceolate, 1-2 cm. long, pubescent; bracts opposite, foliaceous and oblanceolate, or the upper short and acerose; involucres mostly solitary in the axils of the cymes, chartaceous, involucral tube definitely triangular in cross-section, 2 mm. long, ascending long-pubescent, teeth 3, squarrose, as long as the tube, spines abruptly uncinate; flowers pedicellate, barely exserted, perianths cylindric, narrowed above, 2-2.5 mm. long, segments erect, linear-lanceolate, subentire, 0.5 mm. long, short-villous; stamens 9, attached in a ring at the base of the segments, anthers orbicular; achenes smooth, styles short and straight.

Type: "Exposed sandy soil on Point Loma, San Diego, March, 1884." *C. R. Orcutt* (Par.)

Distribution: known only from Point Loma, San Diego County, California.

Specimens examined:

CALIFORNIA: SAN DIEGO COUNTY—Point Loma, March 13, 1884, *Orcutt & Cleveland* (D); Point Loma, March, 1884, *Orcutt* (Par TYPE); San Diego, March, 1884, *Cleveland* (CAS, D); Point Loma, April 2, 1884, *Orcutt* (Par); Point Loma, April, 1884, *Orcutt* (CAS, M, Par, US); Point Loma, April 25, 1897, *Brandegee* (Pom); Point Loma, April 28, 1905, *K. Brandegee* (D, US); Point Loma, April 28, 1905, *T. S. Brandegee* (Pom, US); Point Loma, April 10, 1906, *K. Brandegee* 218 (CAS, D, M, Pom, RMt, US); Point Loma, March 28, 1914, *Parish* 9111 (D).

This is a remarkable species, exceedingly limited in its distribution, and with no very close relatives, its nearest ally probably being *C. corrugata*. Superficially, *C. Orcuttiana* resembles *C. procumbens*, or to an extent, the former *C. polygonoides*.

A specimen in the herbarium of the Missouri Botanical Garden is accompanied by a label which reads, "Parry, Tehachipi." It is thought that this piece of data has been confused with that of another species.

5. *Chorizanthe corrugata* (Torr.) Torr. & Gray, Proc. Am. Acad. 8: 198. 1870; Wats. U. S. Geol. Surv. Fortieth Parallel [Bot. King's Exp.] 5: 485. 1871; Wats. Proc. Am. Acad. 12: 273. 1877; Wats. Botany [of California] 2: 39. 1880;

Parry, Proc. Davenp. Acad. Sci. 4: 53. 1884; Dammer in Engl. & Prantl, Nat. Pflanzenfam. 3^{1a}: 11. 1891; Jepson, Fl. Calif. 397, fig. 69. 1914; Davidson & Moxley, Fl. So. Calif. 113. 1923; Jepson, Man. Fl. Pl. Calif. 299, fig. 320. 1923; Tidestrom, Contr. U. S. Nat. Herb. [Fl. Utah & Nev.] 25: 145. 1925.

Pl. 1, figs. 4-5.

Acanthogonum corrugatum Torr. Pacif. R. R. Rept. 5: 364. 1856.

Erect plants, 0.5-1.5 dm. tall; stems silky spreading pubescent; leaves petiolate, mostly orbicular, 0.75-2 cm. in diameter, floccose-tomentose beneath, villous above; bracts opposite, lower spatulate, reduced and acerose above; lower involucres loosely disposed in the axils of the cymes, upper densely congested, involucral tube cylindric, transversely and obviously corrugated, shortly attenuated at base, 2-2.5 mm. long, glabrate, teeth 3, squarrose, as long as the tube or longer, occasionally foliaceous, the short spines down-curved, not uncinate; flowers included, pedicellate, subcylindric, 2-2.5 mm. long, segments oblong, obtuse, about 0.75 mm. long, subequal, pubescent; stamens 6, inserted at base of segments, anthers orbicular; achenes slightly exserted, papillose at top, styles short, straight.

Type: near Fort Yuma, Arizona, December, 1853, *General Thomas*.

Distribution: southern New Mexico, southern and western Arizona, and the inland parts of the southern half of California.

Specimens examined:

NEW MEXICO: Rincon, April 30, 1884, *Jones* (Pom).

ARIZONA: Colorado River Valley, March, 1876, *Palmer* 642 (M, Par, US); near Fort Mojave, April, 1884, *Lemmon & wife* (US); Franconia, alt. 900 ft., April 17, 1903, *Jones* (Pom); near Yuma, April 27, 1905, *Goldman* 1089 (US); Yuma, April 25, 1906, *Jones* (Pom); Yuma, 1911, *Beard* (M); Sentinel, March 22, 1924, *Orcutt* 91 (US); near Dome, March 6, 1927, *Harrison* 3615 (US); near Mohawk, March 8, 1928, *Peebles & Harrison* 5014 (US).

CALIFORNIA: SANTA CRUZ COUNTY—Santa Cruz, June 29, 1881, *Jones* (Pom); INYO COUNTY—Salt Spring, Death Valley, May 24, 1915, *Parish* 10016 (D); SAN BERNARDINO COUNTY—Needles, May, 1884, *Jones* (US); Kelso, alt. 3000 ft., May 2, 1906, *Jones* (Pom); Baxter, May 23, 1915, *Parish* 9887 (D); near Cottonwood Springs, alt. 500 ft., April, 1920, *Jaeger* 213 (US); 28 miles north of Baker, April 1,

1928, *Howell* 3591 (CAS); on volcanic rock, 28 miles north of Baker, April 1, 1928, *Pearson* 7762 (Pe); near Riggs, April 3, 1928, *Muns & Hitchcock* 10952 (Pom); near Parker, April 22, 1928, *Ferris* 7205 (D); RIVERSIDE COUNTY—Colorado Desert, March, 1881, *Parry* 272 (M, Par, US); Colorado Desert, April, 1905, *Brandegee* (US); Indio, April 20, 1913, *Piemeisel* 3520 (US); near Blythe Junction, alt. 1200 ft., April 2, 1920, *Muns & Harwood* (Pom); Thousand Palm Canyon, alt. 500 ft., February 22, 1926, *Pearson* 6509 (Pe); near Dos Palmos, March 13, 1926, *Hill* (Pom); Salt Creek Wash, March 20, 1927, *Reed* 5477 (Pom); Thousand Palms, March 27, 1927, *Epling* (M); Painted Canyon, April 12, 1927, *Pearson* 7175 (Pe, Pom); Dos Palmos, April 27, 1930, *Gulman* (Pom); SAN DIEGO COUNTY—Colorado Desert, April, 1889, *Orcutt* (M, US); Signal Mt., April 2, 1903, *Abrams* 3222 (D); Agua Caliente, February 26, 1914, *Carlson* (CAS); Yaqui Wells, January 21, 1926, *Jones* (Pom); near Palm Wash, March 24, 1928, *Howell* 3497 (CAS); IMPERIAL COUNTY—Mesquite, March, 1881, *W. F. Parish* (D); near Picacho, April 20, 1928, *Ferris* 7140 (D); Midway Well, March 22, 1932, *Pearson* 9795 (Pe); near Potholes, April 13, 1932, *Johansen & Ewan* 7199 (E).

An outstanding species, easily recognized by the corrugations on the cylindric tubes of the involucres.

6. Chorizanthe interposita Goodman, n. sp.²⁸

Ascending plants; stems 1–2 dm. long, short-villous with ascending or spreading hairs, reddish at maturity; leaves linear and very narrow; bracts verticillate, foliaceous and linear or reduced above, 4–8 mm. long; involucres solitary in the axils of the uniparous cymes, or in small clusters toward the ends of the branches, 5–6 mm. long, the involucral tube triangular in cross-section, 3 mm. long, pubescent, teeth 3, long and divergent, the short spines down-curved or uncinate; flowers nearly sessile, prismatic, 3–3.5 mm. long, submembranaceous, the 6 lobes lanceolate, recurved-apiculate, inner frequently a trifle narrower, 1–1.25 mm. long; stamens 7–9, inserted at the base of

²⁸ *Chorizanthe interposita* Goodman, sp. nov. Planta adscendens; caulis 1–2 dm. longis, brevi-villosis, pilis adaceendentibus vel diffusis; foliis linearibus et angustissimis; bracteis verticillatis, foliaceis et linearibus aut supra minutis, 4–8 mm. longis; involucris solitariis in axillis uniparitarum cymarum, vel ad terminos ramorum in glomerulis parvis, 5–6 mm. longis, involueri tubo prismatico, 3 mm. longo, pubescente, dentibus 3, longis et divergentibus, spinis brevibus, recurvatis vel uncinatis; floribus subsessilibus, prismaticis, 3–3.5 mm. longis, submembranaceis, 6 laciniis lanceolatis, recurvato-apiculatis, interioribus saepe angustioribus, 1–1.25 mm. longis; staminibus 7–9, ad basem laciniarum insertis, filamentis 0.5 mm. longis, singula glandula ad basem filamentarum, antheris orbicularibus; stylis brevibus.—San Quentin, Lower California, April 19, 1886, C. E. Orcutt (Mo. Bot. Gard. Herb. No. 128475 TYPE).

the lobes, filaments 0.5 mm. long, a gland at base of each on the perianth tube, anthers orbicular; styles short.

Type: San Quentin, Lower California, April 19, 1886, C. R. Orcutt (Mo. Bot. Gard. Herb. No. 128475).

Distribution: Lower California.

Specimens examined:

LOWER CALIFORNIA: San Quentin, April 19, 1886, Orcutt (M TYPE).

This intermediate species is an exceedingly interesting one. Superficially resembling the next (*C. Lastarriaea* var. *californica*) very closely, it can be differentiated from it by the narrower bracts, and, more especially, by the presence of a true, 3-toothed involucre containing a non-involucre-like perianth.

7. *Chorizanthe Lastarriaea* Parry var. *californica* (H. Gross) Goodman, n. comb.

Lastarriaea chilensis Remy subsp. *californica* H. Gross in Engl. Bot. Jahrb. 49: 345. 1913.

Lastarriaea chilensis Remy in Torr. & Gray, Proc. Am. Acad. 8: 199. 1870, as to North American specimens; Wats. U. S. Geol. Surv. Fortieth Parallel [Bot. King's Exp.] 5: 477. 1871, as to North American specimens; Wats. Botany [of California] 2: 39. 1880, as to North American specimens; Parry, Proc. Davenp. Acad. Sci. 5: 36. 1887, as to North American specimens; Behr, Fl. Vicinity San Francis. 278. 1888; Dammer in Engl. & Prantl, Nat. Pflanzenfam. 3^{1a}: 10, fig. 4E. 1891, as to North American specimens; Greene, Fl. Francis. 159. 1891; Jepson, Fl. West. Mid. Calif. 149. 1901, and ed. 2. 128. 1911, both as to North American specimens; Abrams, Fl. Los Angeles & Vicinity, 112. 1904, and ed. 2. 103. 1917; Jepson, Fl. Calif. 389. 1914, as to North American specimens; Davidson & Moxley, Fl. So. Calif. 105. 1923; Jepson, Man. Fl. Pl. Calif. 295. 1923, as to North American specimens.

Chorizanthe Lastarriaea Parry, Proc. Davenp. Acad. Sci. 4: 63. 1884, as to North American specimens; Parry, West. Am. Sci. 1: 29. 1885.

Ascending to prostrate plants; stems about 1–1.5 dm. long, pubescent with spreading or ascending hairs; leaves narrowly linear, less than 1 mm. wide, 2–2.5 cm. long, ciliate; bracts in

verticils of 4 or 5, usually connate at base only, lanceolate to linear, 4-7 or 9 mm. long; involucres lacking; flowers solitary in the axils of the uniparous cymes, perianth 4 mm. long, coriaceous, ciliate, tube prismatic, 2 mm. long, lobes 5, two shorter than the others, long-spinose, divergent, uncinate; stamens 3 or more, inserted near the base of the perianth lobes, anthers small and orbicular; styles short.

Type: mesas, San Bernardino Valley, California, April, 1882, Parish 819.

Distribution: Monterey County, California, southward into Lower California.

Specimens examined:

CALIFORNIA: MONTEREY COUNTY—sandy fields, Monterey, July 18, 1882, Pringle (M); SANTA BARBARA COUNTY—sea bluffs at East Point, Santa Rosa Island, April 9, 1930, Muns & Hoffmann 11734 (Pom); SAN BERNARDINO COUNTY—1876, Parry & Lemmon 371 (M); mesas, San Bernardino Valley, April, 1884, Parish Bros. 819 (M); Colton, April 29, 1889, Parish (M); dry mesas, near San Bernardino, alt. about 300 m., May 17, 1917, Parish 11917 (Pom); sandy washes, Highland, alt. 1000 ft., May 9, 1919, Spencer 1110 (Pom); RIVERSIDE COUNTY—Whitewater, alt. 1000 ft., May 11, 1903, Jones (M, Pom, US); near Murrietta, alt. 1500 ft., May 19, 1922, Muns & Johnston 5364 (Pom); LOS ANGELES COUNTY—Pasadena, May 3, 1882, Jones (Pom); dry ridges, Santa Monica, May, 1890, Hasse (M); dry hills, April, 1891, Hasse (M); Ballena Harbor, April 1, 1901, Abrams 1218 (M, Pom); Santa Catalina Island, May 7, 1902, Trask (M); sandy soil, between Claremont and Upland, June 2, 1921, Robinson 94 (Pom); dry soil, San Gabriel Wash, alt. 350 ft., May 26, 1932, Wheeler 745 (M); SAN DIEGO COUNTY—Fallbrook, March 28, 1882, Jones (Pom); San Diego, April 3, 1882, Jones (Pom); Point Loma, May 7, 1902, Brandegee 1623 (M, Pom); San Diego, March-June, 1906, K. Brandegee (M); mesa near San Diego, alt. 4000 ft., Peirson 3360 (Pe); COUNTY NOT KNOWN—1868-1869, Kellogg & Harford 865 (M, US); 1882, Parry (M).

LOWER CALIFORNIA: Todos Santos Bay, April 7, 1886, Orcutt (M); San Quentin Bay, February, 1889, Palmer 722 (US).

The acceptance of Gross' subspecific name is made even though the writer possesses a lack of full knowledge of the South American representatives of the former *Lastarriaeae*. Certainly the North American species are distinguishable from the plant delineated in the plate accompanying the original description of *Lastarriaea chilensis*,²⁷ but whether or not one of

²⁷ Remy in Gay, Fl. Chili 5: 290. 1849; Gay, Hist. Chili, Atlas Bot. 1: pl. 58, fig. 1. 1854.

Philippi's species of *Lastarriaea* would not include var. *californica* is not known.

The absence of certain of the bracts which would normally form the involucre, the reduction of the perianth lobes to 5, and the faucial insertion of the stamens all indicate, it is thought, *C. Lastarriaea* to be the most highly evolved of this series of Chorizanthes.

Section 2. HERBACEAE Benth., in large part. North American annuals, differing chiefly from the annual Suffrutices in the prevailingly larger outer teeth of the involucres as compared with the tube, and the differentiation of the teeth into a long outer trio and a shorter alternating trio. Cotyledons longer than the radicle.

Subsection 1. PUNGENTES, new subsection. Erect or decumbent plants with spreading pubescence. Lower bracts foliaceous or rarely reduced, upper acerose and ciliate. Involucres 6-ribbed and 6-toothed, the teeth prevailingly margined, the alternating 3 shorter except in one species, the anterior tooth a little longer than any of the others. Perianth scantily pubescent on the outer surface, the lobes mostly equal or subequal. Stamens prevailingly 9, inserted at the base of the perianth. Species 8-17, incl.

Range: coastal or in the coast ranges of California from Monterey County to Sonoma County, with outlying species as far north as Mendocino County, and southward into Santa Barbara County; and one species inland in northern California.

8. *Chorizanthe pungens* Benth. Trans. Linn. Soc. Lond. 17: 419, pl. 19, fig. 2. 1836; Torr. Pacif. R. R. Rept. 4: 132. 1856; Benth. in DC. Prodr. 14: 26. 1857; Torr. and Gray, Proc. Am. Acad. 8: 194. 1870; Wats. U. S. Geol. Surv. Fortieth Parallel [Bot. King's Exp.] 5: 484. 1871; Wats. Proc. Am. Acad. 12: 270. 1877; Wats. Botany [of California] 2: 36, 481. 1880; Parry, Proc. Davenp. Acad. Sci. 4: 60. 1884; Behr, Fl. Vicinity San Francis. 278. 1888; Dammer in Engl. & Prantl, Nat. Pflanzenfam. 3^{1a}: 12. 1891; Greene, Fl. Francis. 155. 1891; Greene, Man. Bot. Reg. San Francis. Bay, 49. 1894; Jepson, Fl. West.

Mid. Calif. 151. 1901, and ed. 2. 130. 1911; Jepson, Fl. Calif. 392, *fig. 67c.* 1914; Jepson, Man. Fl. Pl. Calif. 296, *fig. 318.* 1923, excluding vars.

Pl. 1, figs. 10-11.

Chorizanthe Douglasii Benth. var. *albens* Parry, Proc. Davenp. Acad. Sci. 5: 175. 1889; Greene, Fl. Francis. 154. 1891.

Diffuse plants; stems several from the base, 1-3 dm. long, grayish with widely spreading villous hairs; leaves basal, petiolate, oblanceolate, 3-5 cm. long, ascending villous; bracts opposite, the lower similar to the leaves, upper acerose; involucres in dense clusters in compound uniparous cymes, 3.5-4 mm. long, the involucral tube subcylindric, 2-3 mm. long, hispidulous on the ribs with widely spreading hairs, the teeth divergent, straight except for the prevailingly uncinate tip, the alternate 3 a little smaller, plainly margined with a light-colored membrane, this cleft or divided at the sinuses; flower partially exserted, narrowly obconic, 3-3.5 mm. long, perianth lobes subequal and erose, nearly half as long as the tube, the outer 3 obovate or oblong, rounded to truncate, sometimes mucronate, inner oblong, similar, often a little shorter; stamens 9, anthers small and oblong; achene 3 mm. long.

Type: "California, coll. of 1833," *Douglas* (K).

Distribution: northern Monterey County, California.

Specimens examined:

CALIFORNIA: MONTEREY COUNTY—1833, *Douglas* (K TYPE, M photograph); pastures near Monterey, 1848, *Hartweg 1936* (K); Monterey, 1850, *Parry* (US); sandy soil, Monterey, July 8, 1880, *Engelmann* (M); 1880, *M. E. Norton* (US); Monterey, 1881, *Lemmon* (Par); in sandy places, Monterey, July 19, 1882, *Pringle* (Ph); Salinas Valley, April 20, 1888, *Parry* (M, Par TYPE of *C. Douglasii* var. *albens*, US); Hotel del Monte grounds, May 1, 1888, *Hasse* (M); Seaside, April 13, 1894, *Dudley* (D); Pacific Grove, June-July, 1898, *Nott* (D); sandy beach, May 16, 1900, *Grant* (D); Del Monte, May 16, 1900, *Grant 2605* (Pom); Del Monte, April, 1902, *Elmer 3570* (CAS, D, M, US); near Seaside, May 19, 1903, *Heller 6749* (D, M, Ph, Pom, RMt, US); Moss Beach, June 10, 1906, *McGregor 42* (D); Pacific Grove, June 7, 1907, *Patterson & Wilts* (D); Seaside, March 31, 1910, *Randall 221* (D); Seaside, May 29, 1912, *Eastwood 150* (US); near Monterey, June 27, 1923, *Pearson 3707* (Pe); Monterey Point, June 9, 1929, *Dearing* (E).

A specimen of Nuttall's which seems referable to *pungens* is labeled "St. Simeon" (San Luis Obispo County). Two

specimens from near Castroville, Monterey County (*K. Brandegee*, June 16, 1908, and *Dearing*, June 9, 1929) are doubtfully referred to this species.

C. pungens has been considered one of the most variable species in the genus, and while it is still to be regarded as variable, it is not unusually so as here delimited. The size of the plant and the character of the perianth lobes are the most variable characters; the pubescence and the character of the involucral teeth being, perhaps, the next.

Parry's *C. Douglasii* Benth. var. *albens* is here considered a white-pubescent phase of *C. pungens*. The reason that Parry referred this variety to *Douglasii* is apparently because even after having seen type material of *Douglasii* the outstanding character of the continuous involucral membrane was overlooked. Most or all of the plants which Parry referred to *C. Douglasii*, the present writer would designate as the purple-margined variety of *pungens*, namely, var. *Hartwegi*.

The figure of the involucre of *C. pungens* which accompanies Bentham's original description shows the involucral teeth as straight. It happens that on the type specimen the teeth are straight on many of the involucres, on the others they are uncinate. Though the latter condition prevails, straight teeth are sometimes met with.

**8a. *Chorizanthe pungens* Benth. var. *Hartwegi* (Benth.)
Goodman, n. comb.**

Chorizanthe Douglasii Benth. var. *Hartwegi* Benth. in DC. Prodr. 14: 26. 1857; Torr. & Gray, Proc. Am. Acad. 8: 194. 1870, in synonymy.

Less decumbent than the species, spreading villous-pubescent, sometimes hoary; stems, leaves, bracts, and inflorescence similar to the species; involucres commonly purplish, especially the marginal membrane, the latter parted or divided at the sinuses, otherwise as in the species; flower partly exserted, narrowly obconic, 3–3.5 mm. long, often yellowish, outer lobes obovate to oblong, erose, very often mucronate, inner oblong, similar; stamens 9, anthers small, oblong.

Type: dry mountain pastures near Santa Cruz, California, coll. of 1848, Hartweg 1935 (K).

Distribution: Santa Cruz County, California, and occasionally adjacent counties to north and south.

Specimens examined:

CALIFORNIA: SAN FRANCISCO COUNTY—San Francisco, July 16, 1881, *Jones* (Pom); SANTA CRUZ COUNTY—dry mountain pastures near Santa Cruz, 1848, *Hartweg* 1935 (K TYPE, M fragment and photograph); Santa Cruz, 1881, *Jones* (US); Santa Cruz, July 1, 1881, *Jones* 2327 (Pom); Santa Cruz, June, 1882, *Parry* (M, Par); Santa Cruz Mts., July 13, 1882, *Pringle* (M, US) Santa Cruz Mts., July 15, 1882, *Pringle* (Ph); sandy fields, Santa Cruz Mts., July 26, 1882, *Pringle* (M, US); Santa Cruz Mts., 1883, *Parry* (US); Santa Cruz, 1888, *Parry* (M, Par, US); Ben Lomond, 1888, *Parry* 13 (Par); Flat Rock, Big Basin, May 29, 1897, *Dudley* (D); near Eccles, Santa Cruz Mts., June 26, 1897, *Dudley* (D, M); Ben Lomond, May, 1903, *Elmer* 4671 (CAS, D, M, US); Felton, July 11, 1903, *Mrs. B. H. Thompson* (M); Felton, July 11, 1903, *C. H. Thompson* (D); Santa Cruz, June 21, 1917, *Reed* (CAS); sandy hills near Mt. Hermon, May 18, 1926, *Baigalupi* 1491 (D); Santa Cruz Mts., June 16, 1929, *Rountree* (Pom); sand hills, Ben Lomond, June 20, 1933, *Rose* 33235 (CAS); MONTEREY COUNTY—sandy fields, July 16, 1882, *Pringle* (M, US); Pacific Grove, July 8, 1914, *Newell* (CAS, US).

This variety, ranging just to the north of the species, is usually readily distinguishable from *C. pungens* by the purplish involucral margin. The flowers generally have more evidently obovate, erose and mucronate outer lobes, and in this respect the variety does approach *C. Douglasii*.

9. *Chorizanthe cuspidata* Wats. Proc. Am. Acad. 17: 379. 1882; Greene, Fl. Francis. 156. 1891; Greene, Man. Bot. Reg. San Francis. Bay, 49. 1894.

Chorizanthe pungens Benth. var. *cuspidata* (Wats.) Parry, Proc. Davenp. Acad. Sci. 4: 60. 1884; Jepson, Fl. Calif. 392. 1914; Jepson, Man. Fl. Pl. Calif. 297. 1923.

Decumbent plants; stems 1–2.5 dm. long, spreading villous; leaves basal, petiolate, oblanceolate, 2–3.5 cm. long, clothed with short, ascending, villous hairs; bracts opposite, lower similar to the leaves, upper acerose; involucres 3.5–4 mm. long, in dense clusters on the compound, uniparous cymes, involucral tube triangular in cross-section, campanulate to urceolate, about 2 mm. long, pubescent to glabrate, the teeth spreading and uncinate, marginal membrane lacking or vestigial; flower partly exserted, subcylindric, 2–2.5 mm. long, outer segments oblong, half as long as the perianth tube, inner a trifle shorter

and narrower, all entire and tipped with a short cusp; stamens 9, anthers oblong.

Type: San Francisco, California, July 16, 1881, *M. E. Jones* 2386 (G).

Distribution: chiefly in vicinity of San Francisco, California, and in adjacent counties to the northward and southward.

Specimens examined:

CALIFORNIA: SONOMA COUNTY—sand hills at north end of Bodega Bay, June 8, 1930, *Howell* 5271 (CAS); SAN FRANCISCO COUNTY—San Francisco, *Wilkes* 1522 (US); near San Francisco, 1865, *Torrey* 434 (US); sandy fields, San Francisco, May 1, 1865, *Bolander* 112 (M); San Francisco, May 16, 1868, *Kellogg & Harford* (RMt, US); San Francisco, June 16, 1868, *Kellogg & Harford* (D, M, US); San Francisco, June 16, 1868, *Kellogg & Harford* 6 (US); Lone Mountain, San Francisco, July 10, 1868, *Kellogg & Harford* (US); Merced Lake, August 22, 1868, *Kellogg & Harford* (US); San Francisco, July 16, 1878, *Moore* (CAS); near San Francisco, 1880, *Vasey* 539 (US); San Francisco, July 16, 1881, *Jones* (Ph); Golden Gate Park, July 16, 1881, *Jones* 186 (Pom); San Francisco, July 16, 1881, *Jones* 2386 (D, M, Pom, US ISOTYPES); San Francisco, 1882, *Parry* (M); San Francisco, May 12, 1882, *Jones* (CAS, Pom); San Francisco, May 19, 1882, *Jones* (Pom); Golden Gate Park, June, 1882, *Parry* (M); San Francisco, June, 1886, *Curran* (D); Lake Merced, June, 1892, *Michener & Bioletti* (US); Lone Mountain, San Francisco, June 3, 1894, *Dudley* (D); between Presidio and park, San Francisco, May 21, 1896, *Cannan* (US); between Presidio and park, San Francisco, May 21, 1896, *Eastwood* (CAS); Lake Merced, June 8, 1902, *Heller* 5666 (D, M, Ph, Pom, RMt, US); vicinity of Lake Merced, May, 1903, *Gardner* 548 (US); sand hills near San Francisco, May 3, 1903, *Baker* 2842 (M, Pom, RMt, US); near San Francisco, June, 1903, *Baker* 5072 (D, Pom); San Francisco, 1905, *K. Brandegee* (M, Pom, RMt, US); sand dunes, near Lake Merced, April 24, 1926, *Howell* 1956 (CAS); near Sutro Heights, San Francisco, June 21, 1930, *Howell* 5316 (CAS); sandy ground near Relief Home, San Francisco, June 1, 1933, *Eastwood* (CAS); Lake Merced, San Francisco, July 9, 1933, *Howell* 11450 (CAS); SAN MATEO COUNTY—Crystal Springs Lake, May, 1903, *Elmer* 4793 (M, US); San Pedro, May, 1903, *Elmer* 4793 (CAS, D, Pom); SANTA CRUZ COUNTY—Santa Cruz, June, 1881, *Jones* (US); COUNTY NOT KNOWN—1866, *Bolander* (US); *Bridges* 286 (US).

C. cuspidata has been considered as but a variety of *C. pungens* by some taxonomists, but the present comparative study indicates it as a good species. It is true that the involucral membranes in *C. cuspidata* are not always completely lacking, and they are regularly present in the variety *marginata*, thus evidencing close relationship to *pungens*. However, important differentiating characters are to be found in a more fundamental organ, namely, the perianth. Here the smaller

flower, and the narrow, entire to subentire, apiculate lobes amply separate the species from *C. pungens*. Further, the range of *C. cuspidata* is quite distinct from that of *C. pungens*.

9a. *Chorizanthe cuspidata* Wats. var. *marginata* Goodman, n. var.²⁸

Ascending to decumbent plants; stems 2-4 dm. long, spreading villous; leaves basal, petiolate, oblanceolate to spathulate, 3.5-5 cm. long; lower bracts similar to the leaves, upper acerose; inflorescence as in the species; involucres ascending pubescent, the teeth margined with an evident membrane, this and the involucral tube often purplish; otherwise as in the species.

Type: San Pedro, San Mateo County, California, May, 1903, Elmer 4828 (M).

Distribution: San Francisco and San Mateo Counties, California, and rarely southward.

Specimens examined:

CALIFORNIA: SAN FRANCISCO COUNTY—San Francisco, 1905, K. Brandegee (D); near Ocean View, June 8, 1906, Heller 8383 (CAS, D, M, Ph, US); Laurel Hill Cemetery, June 6, 1912, Eastwood 222 (CAS, US); Lake Merced, May 20, 1918, Eastwood (CAS); SAN MATEO COUNTY—Colma, May 11, 1901, Abrams 1603 (D, Pom, RMt); near Colma, May 11, 1901, Dudley (D); San Pedro, May, 1903, Elmer 4828 (CAS, D, M TYPE, Pom, US); MONTEREY COUNTY—Seaside, May 29, 1912, Eastwood 150a (CAS); COUNTY NOT KNOWN—1875, Vasey (US).

This variety is intermediate between *C. cuspidata* and *C. pungens* var. *Hartwegi*, and probably gave rise to the former. The floral morphology serves definitely to ally the new variety to *C. cuspidata*, and the geographic distribution agrees with such a contention.

The specimens of *C. cuspidata* var. *marginata* thus far seen average larger, more erect, and possess larger bracts than do those of typical *cuspidata*.

²⁸ *Chorizanthe cuspidata* Wats. var. *marginata* Goodman, var. nov. Planta ascendens vel decumbens; caulis 2-4 dm. longis, diffuse villoso; foliis basalibus, petiolatis, oblanceolatis vel spathulatis, 3.5-5 cm. longis; bracteis inferioribus foliis similibus, superioribus acerosis; inflorescentia speciei simile; involucris adscendente pubescentibus, margine dentium membrana purpurascente, tubo involueri saepe purpurascente. Cetera speciei similia.—San Pedro, San Mateo County, California, May, 1903, Elmer 4828 (M TYPE).

10. *Chorizanthe angustifolia* Nutt. Jour. Acad. Phila. N. S. 1: 167. 1848; Benth. in DC. Prodr. 14: 26. 1857, excluding specimens from near San Francisco; Torr. & Gray, Proc. Am. Acad. 8: 194. 1870, in synonymy.

Decumbent plants; stems several from the base, 1–4 dm. long, canescent with ascending hairs; leaves basal, petiolate in the larger plants, oblanceolate, 2–5 cm. long, gray with villous hairs; bracts similar, reduced above; inflorescence of numerous medium-sized clusters of involucres, rather closely arranged on compound uniparous cymes; involucres about 3.5 mm. long, the tube cylindro-triangular in cross-section, 2 mm. long, with spreading, villous hairs, teeth slender, spreading, straight except for the uncinate tips, the larger as long as the tube, marginal membranes lacking; flower scarcely exserted, cylindric, 2–2.5 mm. long, lobes similar, oblong, acute to truncate and erose at apex, 0.75 mm. long; stamens 3, anthers suborbicular, minute.

Type: "Pueblo los Angeles, Upper California," *Gambel* (Ph).

Distribution: probably only Santa Barbara County, California.

Specimens examined:

CALIFORNIA: near Santa Maria, Santa Barbara County, June 13–July 3, 1906, Eastwood 351 (CAS); sandy soil near Buellton, Santa Barbara County, May 30, 1929, Hoffmann (E); "Pueblo los Angeles," *Gambel* (M photograph, Ph TYPE).

This species, the most southern of the subsection *Pungentes*, is doubtless a derivative of *C. pungens* (or an ancestor similar to *C. pungens*). *C. angustifolia* has undergone some of the same evolution, in the loss of the marginal membrane of the involucre, that *C. cuspidata*, whose range lies to the north of that of *C. pungens*, has manifested.

Grayish plants in aspect, they are readily recognized as "*pungens*" relatives, despite the lack of the characteristic involucral margins, by the foliaceous, opposite, oblanceolate bracts, and the inflorescence.

The name *C. angustifolia* has not appeared in any treatments of *Chorizanthe* since Torrey and Gray put the species

in synonymy in 1870, and collections made during the past several years which were referable to this species or its variety have, of course, been troublesome.

In the light of subsequent collections, it seems unlikely that the type of *C. angustifolia* was collected as far south as Los Angeles.

10a. *Chorizanthe angustifolia* Nutt. var. *Eastwoodae* Goodman, n. var.²⁹

Flowers 2.5–3 mm. long, stamens 8–9. Otherwise as the species.

Type: sandy soil, Morro Bay, San Luis Obispo County, California, May 16, 1928, *Eastwood* 15108 (CAS).

Distribution: San Luis Obispo and Santa Barbara Counties, California.

Specimens examined:

CALIFORNIA: SAN LUIS OBISPO COUNTY—dry hills, near coast, 1884, *Summers* (US); Haynes ranch, July, 1912, *Ingalls* (CAS); sand hills near Pismo Beach, June 10, 1917, *Abrams* 6516 (D); Morro, April 7, 1927, *Eastwood* 14866 (CAS); Morro Bay, May 16, 1928, *Eastwood* 15108 (CAS); Morro Bay, May 16, 1928, *Eastwood* 15108 (CAS TYPE, D, M photograph); between Guadelupe and Callender, April 15, 1929, *Ferris* 7613 (D); near San Luis Obispo, *Roadhouse* 401 (US); SANTA BARBARA COUNTY—sand dunes, Surf, April 20, 1929, *Pearson* 8310 (CAS, Pe); sandy field, Santa Maria, April 22, 1929, *Hoffmann* (E); near Buellton, May 31, 1931, *Hoffmann* (Pom).

Most of the “*angustifolia*” material is referable to this less reduced variety.

11. *Chorizanthe diffusa* Benth. Pl. Hartweg. 333. 1857; Benth. in DC. Prodr. 14: 26. 1857; Torr. & Gray, Proc. Am. Acad. 8: 193. 1870; Wats. U. S. Geol. Surv. Fortieth Parallel [Bot. King's Exp.] 5: 484. 1871; Wats. Proc. Am. Acad. 12: 270. 1877; Wats. Botany [of California] 2: 36, 481. 1880; Greene, Fl. Francis. 156. 1891.

Chorizanthe pungens Benth. var. *diffusa* (Benth.) Parry, Proc. Davenp. Acad. Sci. 4: 60. 1884; Jepson, Fl. Calif. 392. 1914; Jepson, Man. Fl. Pl. Calif. 297. 1923.

**Chorizanthe angustifolia* Nutt. var. *Eastwoodae* Goodman, var. nov. Planta speciei similis sed floribus 2.5–3 mm. longis; staminibus 8–9.—Sandy soil, Morro Bay, San Luis Obispo County, California, May 16, 1928, *Eastwood* 15108 (CAS TYPE).

Chorizanthe pungens Benth. var. *nivea* Curran, Bull. Cal. Acad. Sci. 1: 274. 1885; Jepson, Fl. Calif. 392. 1914.

Chorizanthe nivea (Curran) Jepson, Man. Fl. Pl. Calif. 297. 1923.

Chorizanthe Andersoni Parry, Proc. Davenp. Acad. Sci. 5: 175. 1889; Greene, Fl. Francis. 156. 1891; Jepson, Fl. Calif. 392. 1914, in synonymy.

Decumbent to ascending plants; stems several from the base, 1-2.5 dm. long, grayish with spreading or ascending pubescence; leaves basal, petiolate, oblanceolate, 2-4.5 cm. long, thickly short-villous beneath, at least when young, and sparsely villous above; bracts opposite, prevailingly acerose; involucres 3 mm. long, disposed in clusters in subequally branched cymes, the involucral tube triangular in cross-section, 2 mm. long, sparsely villous-hirsute with widely spreading hairs, the 6 teeth spreading and uncinate, the alternating 3 considerably shorter, all margined by a conspicuous, white membrane, this parted at the sinuses; flower partially exserted, subcylindric, about 2.5 mm. long, lobes similar, oblong, the apices acutish, entire or nearly so, 0.5 mm. long; stamens 9, anthers suborbicular to oval.

Type: in dry, sandy places near Monterey, California, 1848, Hartweg 1938 (K).

Distribution: San Mateo and Santa Clara Counties southward to Santa Barbara County, California.

Specimens examined:

CALIFORNIA: SAN MATEO COUNTY—Jasper Ridge, May 29, 1910, Dudley (D); SANTA CLARA COUNTY—Jasper Ridge, May, 1901, Abrams 1653 (D); SANTA CRUZ COUNTY—near Fulton, August, 1883, Parry (M); Ben Lomond, 1888, Parry 21^a (Par TYPE of *C. Andersoni*, US); Ben Lomond, June 28, 1888, Parry (M); Big Basin, June 7, 1895, Dudley (D); Santa Cruz, June 22, 1903, Thompson (D, M); sandy hills near Mt. Hermon, May 18, 1926, Bacigalupi 1490 (D); Santa Cruz Mts., June 16, 1929, Bowntree (Pom); MONTEREY COUNTY—dry sandy places near Monterey, 1848, Hartweg 1938 (K TYPE, M photograph, US photograph); Monterey, Parry (M, Par); Monterey, May 12, 1889, Parry (Par); near Seaside, May 19, 1903, Heller 6750 (D, M, Ph, Pom, RMt, US); Monterey, June, 1903, Elmer 5084a (US); Carmel-by-the-Sea, April 30, 1910, Randall 427 (D); Carmel River, August 15, 1910, Clemens (Pom); Seaside, May 29, 1912, Eastwood 151 (CAS); near Monterey, June 26, 1923, Pearson 8665 (Pe); near Del Monte, June 27, 1927, Heller 14404 (M, Ph); SAN LUIS OBISPO COUNTY—Arroyo Grande hills, July, 1883,

Summers 1 (US); mountain near San Luis Obispo, July, 1885, *Curran* (D, Par, Pom isotypes of *C. pungens* var. *nivea*); Price Cañon, *Brandegee* 85 (D, M, Pom, RMt, US); SANTA BARBARA COUNTY—dry ridge, head of Purissima Canyon, March 26, 1925, *Muns* 9275 (Pom); near Buellton, May 30, 1929, *Hoffmann* (E).

Despite the confusion that has existed concerning this species, it is well marked both as to aspect and technical characters. Obviously a member of the *Pungentes* subsection because of the involucral margins, it is unique in the lack (except in very young specimens) of foliaceous bracts. The broad, white involucral membrane makes the clusters of involucres almost showy for the genus. The perianths, which when fresh frequently have yellow-tipped lobes and a white tube, are distinctive by the acutish, very nearly entire segments.

Dr. Jepson recognizes Mrs. Curran's *C. pungens* Benth. var. *nivea* as a species, and designates these specimens from the southern portion of the range as erect. In the original description of var. *nivea*, Mrs. Curran stated that it was "decumbent," and such a characterization certainly applies correctly to the type collection. Herbarium material would indicate that the plants which are "erect" are but young specimens of *diffusa*.

12. *Chorizanthe Howellii* Goodman, n. sp.³⁰

Pl. 3, fig. 1.

Spreading to decumbent plants; stems several from the base, thick, 1–2 dm. long, ascending villous; leaves basal, petiolate, spatulate to broadly obovate, 3–5 cm. long, gray villous-hirsute beneath, more sparsely villous above; bracts opposite, sim-

* *Chorizanthe Howellii* Goodman, sp. nov. Planta patula vel decumbens; caulis pluribus e base, crassis, 1–2 dm. longis, adscendente villosis; foliis basali-bus, petiolatis, spatulatis vel late obovatis, 3–5 cm. longis, subter cinereo-villoso-hirsutis, supra sparse villosis; bracteis oppositis, similibus foliis aut superioribus multum minoribus; involueris 5–6 mm. longis, in glomerulis densis 2–3 cm. latis dispositis, tubo involueri subcylindrico, 3 mm. longo, inter costas adscendente villoso, dentibus patulis, spinis rectis, 3 alternatis brevioribus, omnibus membrana marginatis, ad sinus divisis; floribus paulo exsertis, subcylindricis, 4 mm. longis, lobis exterioribus circiter 1 mm. longis, interioribus 0.25 mm. brevioribus, omnibus oblongis, ad apices truncatis et denticulatis; staminibus 9, antheris ovalibus; achaenii 3.5 mm. longis.—Sand dunes on Mendocino coastal plain, Ft. Bragg, Mendocino County, California, alt. 50 ft., May 26, 1929, J. T. Howell 4233 (CAS TYPE).

ilar to the leaves, or the upper much reduced; involucres 5–6 mm. long, disposed in dense clusters, these 2–3 cm. broad, the involucral tube subcylindric, 3 mm. long, ascending villous between the ribs, teeth spreading, the spines straight, the 3 alternate a little shorter, all margined with a membrane, this parted at the sinuses; flower slightly exserted, subcylindric, 4 mm. long, outer lobes a little over 1 mm. long, inner 0.25 mm. shorter, all oblong, truncate, and denticulate at apices; stamens 9, anthers oval; achene 3.5 mm. long.

Type: sand dunes on Mendocino coastal plain, Ft. Bragg, Mendocino County, California, alt. 50 ft., May 26, 1929, J. T. Howell 4233 (CAS).

Distribution: Mendocino County, California.

Specimens examined:

CALIFORNIA: MENDOCINO COUNTY—sand dunes on Mendocino coastal plain, Fort Bragg, alt. 50 ft., May 26, 1929, Howell 4233 (CAS TYPE, M photograph); on the beach, Fort Bragg, July, 1931, Hutchinson (M); Fort Bragg, July 12, 1931, Jones 28863 (M).

C. Howellii is the most northern of the close relatives of *C. pungens*. Its nearest relative is *C. villosa*, from which it can be readily differentiated by the presence of marginal membranes on the involucres, and by the broadly spatulate leaves and bracts.

It is a pleasure to dedicate this species to John Thomas Howell, Assistant Curator of the Herbarium of the California Academy of Sciences, important collector of Pacific Coast plants, and friend who has conferred many favors upon the writer during the course of this study.

13. *Chorizanthe villosa* Eastwood, Bull. Torr. Bot. Club 30: 485. 1903; Jepson, Fl. Calif. 392. 1914, in synonymy.

Spreading plants; stems several from the base, slender, 2–4 dm. long, gray with spreading villous hairs; leaves basal or essentially so, petiolate, oblanceolate, 4 or 5 cm. long, villous; bracts opposite, similar to the leaves, reduced above; involucres 4 mm. long, in cymose clusters along the stems, the clusters about 1 cm. broad, the involucral tube more or less triangular in cross-section, 2.5 mm. long, shortly and rather densely and evenly villous with ascending hairs, the teeth divergent, the

spines straight, marginal membrane obsolete; flower barely included, narrowly obconic, 3 mm. long, lobes about 0.75 mm. long, oblong, obtuse, mucronate, pubescent with hairs which often exceed the lobes; stamens 9, anthers oblong; mature achene slightly exserted.

Type: Bodega Point, Sonoma County, California, July 4, 1900, *Eastwood* (CAS).

Distribution: Sonoma and Marin Counties, California.

Specimens examined:

CALIFORNIA: SONOMA COUNTY—Bodega Point, July 4, 1900, *Eastwood* (CAS TYPE, M photograph, US); sand dunes, Bodega Point, June, 1905, K. Brandegoo (M, Ph, Pom, RMt, US); Bodega Point, June 29, 1915, *Eastwood* 4832 (CAS, US); MARIN COUNTY—Dillon's Beach, June 6, 1890, *Congdon* (D).

Of the specimens thus far seen of this species, the teeth of the involucres are an amber-yellow.

14. *Chorizanthe robusta* Parry, Proc. Davenp. Acad. Sci. 5: 176. 1889; Greene, Fl. Francis. 154. 1891; Greene, Man. Bot. Reg. San Francis. Bay, 49. 1894; Jepson, Fl. West. Mid. Calif. 150. 1901, and ed. 2. 129. 1911.

Chorizanthe Douglasii Parry, Proc. Davenp. Acad. Sci. 4: 56. 1884, not Benth.

Chorizanthe pungens Benth. var. *robusta* (Parry) Jepson, Fl. Calif. 392. 1914; Jepson, Man. Fl. Pl. Calif. 297. 1923.

Erect plants, 1.5–5 dm. tall; stem 1 or few from the base, thick, branched from the middle or near the bottom, spreading hirsute; leaves basal or nearly so, petiolate, the petiole frequently long and slender, oblanceolate, 4–8 cm. long, hirsute; bracts opposite or verticillate, similar to the leaves, the upper reduced; involucres long-campanulate, about 6 mm. long, arranged in large, dense, cymose clusters, these 2–4 cm. broad, the involucral tube subcylindric, 3.5–4 mm. long, evenly hirsute, teeth but slightly divergent, margined by an evident membrane, this parted at the sinuses, spines minute, straight or very shortly recurved to uncinate; flower included, shortly pedicellate, narrowly obconic, 3–4 mm. long, lobes oblong or slightly elliptic, rounded-erose, sometimes mucronate, 1–1.5 mm. long, subequal or the inner a little shorter; stamens 9, anthers linear-oblong, 0.5 mm. long.

Type: dry sandy soil, margins of Monterey Bay, north of Aptos, Santa Cruz County, California, June, 1883, Parry (Par.)

Distribution: Alameda and Santa Clara Counties, southward to Monterey County, California.

Specimens examined:

CALIFORNIA: ALAMEDA COUNTY—Alameda, July 4, 1866, Bolander 1939 (M, US); Alameda, 1887, Parry (D); Alameda, 1888, Parry 15^a (Par, US); Alameda, May, 1891, Greene (US); SANTA CLARA COUNTY—San Jose, 1882, Parry (M); SAN FRANCISCO COUNTY—Ocean View, June 11, 1889, Congdon (US); SAN MATEO COUNTY—Colma, June, 1905, K. Brandegoo (D, RMt, US); SANTA CRUZ COUNTY—Santa Cruz, June 24, 1881, Jones 2253 (M, Ph, Pom); Santa Cruz, June, 1883, Parry (M, Par); Aptos, June, 1883, Parry (CAS, Par TYPE); Santa Cruz, June 22, 1903, C. H. Thompson (M); near Watsonville, July 8, 1907, Smith (D); Santa Cruz, June 21, 1917, Read (CAS); salt marsh, near Watsonville, July 5, 1929, Hayward (D); MONTEREY COUNTY—Monterey, 1850, Andrews 15 & 14 (ISC); near Soledad, June, 1881, Congdon (D); Salinas Valley; near Monterey Bay, June-July, 1889, Abbott (CAS); Del Monte, September, 1902, Elmer 4047 (D, Pom); near Moss Landing, September 27, 1903, Abrams 4047 (D); Carmel, August 22, 1909, Abrams 4283 (D).

In many of its characters, *C. robusta* is quite as variable as *C. pungens*. In poorly developed specimens, the involucres are apt to be somewhat shorter than in the species, and sometimes the involucral teeth are spreading instead of divergent. Not infrequently the apiculations of the perianth lobes are present only on certain flowers of a plant, or only on certain lobes of a flower.

15. *Chorizanthe valida* Wats. Proc. Am. Acad. 12: 271. 1877; Wats. Botany [of California] 2: 36. 1880; Parry, Proc. Davenp. Acad. Sci. 4: 57. 1884; Greene, Fl. Francis. 155. 1891; Greene, Man. Bot. Reg. San Francis. Bay, 49. 1894; Jepson, Fl. West. Mid. Calif. 150. 1901, and ed. 2. 129. 1911; Jepson, Fl. Calif. 394. 1914; Jepson, Man. Fl. Pl. Calif. 297. 1923.

Pl. 1, figs. 8-9.

Erect plants, 1-3 dm. tall; stem solitary, villous, only slightly branched; leaves basal or nearly so, petiolate, broadly oblanceolate, short-villous, or glabrate above; bracts foliaceous, similar to the leaves, upper acerose; inflorescence of large, dense, cymose, leafy bracted clusters of involucres, the clusters 2-3 cm. broad; involucres subcylindric, 5-6 mm. long, the tube 4

mm. long, finely cross-corrugated, scantily appressed-pubescent to glabrate, teeth erect or a little divergent, bordered by an inconspicuous membrane, spines straight, light-colored; flower cylindric, 5–6 mm. long, outer lobes oblong, truncate, erose to denticulate at apex, 1.75–2 mm. long, inner narrower and elliptic, 1–1.25 mm. shorter; stamens 9, the anthers linear-oblong, 1 mm. long.

Type: "Russian Colony" (G).

Distribution: Sonoma and Marin Counties, California.

Specimens examined:

CALIFORNIA: SONOMA COUNTY—Samuels 194 (US); Samuels 195 (US); MARIN COUNTY—Point Reyes, July, 1903, Elmer 4756 (CAS, D, M, Pom, US).

Perhaps the most important morphologic modification to be found in this species is the greatly shortened inner perianth lobes. The erect, straight, light-colored involucral teeth are also unusual and serve well in making the species easily recognizable.

16. *Chorizanthe Douglasii* Benth. *Trans. Linn. Soc. Lond.* 17: 418. 1836; Benth. in DC. *Prodr.* 14: 25. 1857; Torr. & Gray, *Proc. Am. Acad.* 8: 193. 1870; Wats. *U. S. Geol. Surv. Fortieth Parallel [Bot. King's Exp.]* 5: 484. 1871; Wats. *Proc. Am. Acad.* 12: 270. 1877; Wats. *Botany [of California]* 2: 35. 1880; Parry, *Proc. Davenp. Acad. Sci.* 4: 56. 1884, as to name only; Behr, *Fl. Vicinity San Francis.* 278. 1888, as to name only; Dammer in Engl. & Prantl, *Nat. Pflanzenfam.* 3^{te}: 11. 1891; Greene, *Fl. Francis.* 154. 1891; Jepson, *Fl. West. Mid. Calif.* 150. 1901, and ed. 2. 129. 1911, as to name only; Jepson, *Fl. Calif.* 392. 1914, as to name only; Jepson, *Man. Fl. Pl. Calif.* 297. 1923, as to name only.

Chorizanthe Nortonii Greene, *Pittonia* 2: 164. 1891; Jepson, *Fl. Calif.* 391, *fig. 67b.* 1914; Jepson, *Man. Fl. Pl. Calif.* 296, *fig. 317.* 1923.

Erect plants, 1–3 dm. tall; stem solitary, branched above, curly ascending pubescent with a few spreading villous hairs; leaves basal, oblanceolate, narrowed to a short petiole, 2–5 cm. long, villous-hispid; bracts similar to the leaves, verticillate, frequently a medial, caudine whorl present, those subtending

the involucres acerose; peduncles of the inflorescence umbellately arranged; involucres disposed terminally in dense, medium-sized, subspherical, cymose clusters, the involucral tube more or less triangular in cross-section, 2.5–3 mm. long, ascending hirsute, sometimes densely so, teeth shorter than the tube, bordered with a broad, purplish membrane, this continuous through the sinuses, not cleft or parted; flower obconic, about 3.5 mm. long, outer lobes obovate to oblong, cuneate, truncate to retuse, denticulate, apiculate by the excurrent midrib, about 1 mm. long, inner a little shorter, obovate, emarginate; stamens 9, anthers linear-oblong.

Type: California, coll. of 1833, *Douglas* (K).

Distribution: San Benito, Monterey, and San Luis Obispo Counties, California.

Specimens examined:

CALIFORNIA: SAN BENITO COUNTY—San Benito River, near Merrill Valley, alt. 1900 ft., May 24, 1915, *Hall* 9922 (US); San Benito, May 16, 1918, *Eastwood* 6948 (CAS, US); The Pinnacles, May 31, 1920, *Sutliffe* (CAS); Pinnacles, May 15, 1929, *Dr. & Mrs. Linsdale* (CAS); MONTEREY COUNTY—1833, *Douglas* (K TYPE, M fragment and photograph, Par fragment, US photograph); Soledad, June, 1881, *Congdon* (D); Salinas River, June, 1889, *Brandegee* (Pom); Palisades and Chalone Peaks near Gonzales, alt. 2000–4000 ft., May, 1891, *Norton* (CAS, D, M photograph of *C. Nortonii*); June, 1891, *Norton* (CAS, D, US); near Mission, May 11, 1895, *Dudley* (D); Stony Creek, San Migueleta Ranch, Santa Lucia Mts., May 1–12, 1897, *Eastwood* (US); Santa Lucia Mts., June, 1898, *Plaskett* 157 (US); Tassajara Hot Springs, June, 1901, *Elmer* 3253 (D, M, US); Carmel Valley, June 25, 1905, *Dudley* (D); Carmel River, July 1, 1906, *McMurphy* (D); Burro Trail, Santa Lucia Mts., June 9, 1909, *K. Brandegee* (US); Carmel River, August 15, 1910, *Clemens* (Pom); Tassajara Springs, July, 1916, *Kelly* (CAS); "Big Pinnacles," April 27, 1919, *Ferris* 1696 (D); Sur Ridge, Santa Lucia Mts., May 13, 1920, *Abrams* 7443 (D); Rancho del Monte, Carmel River, May 7, 1921, *Mason* (D, US); cañon of Cachagua Creek, below Tassajara, May, 1926, *C. Dudley* (D); Tassajara Springs, May 30, 1926, *Durbrow* (CAS); pine woods, Santa Lucia Mts., alt. 4720 ft., June 27, 1929, *Rowntree* (E); Arroyo Seco Road, June 28, 1929, *Rowntree* (Pom); 20.5 miles west of King City, Santa Lucia Mts., May 23, 1931, *Howell* 6516 (CAS, M); alt. 1900 ft., *Clemens* (US); SAN LUIS OBISPO COUNTY—Camp 27, Atascadero Ranch, May 1, 1861, *Brewer* (US); Camp 27, Atascadero Ranch, April 30, 1861, *Brewer* 893 (US); Santa Margarita, May 11, 1933, *Wall* (CAS).

The identity of this species for the last several years has been essentially lost, and Greene's name, *Nortoni*, applied to it. *C. Douglasi* is very readily recognized by the funnel-like upper part of the involucres which is formed by the broad,

usually purple, marginal membrane. Unlike the other species, here this membrane is not cleft in the sinuses but extends almost directly from tooth to tooth.

The medial whorl of caudine bracts and the umbellate arrangement of the peduncles is reminiscent of the morphology of *Eriogonum heracleoides*.

17. **Chorizanthe stellulata** Benth. Pl. Hartweg. 333. 1857; Benth. in DC. Prodr. 14: 26. 1857; Torr. & Gray, Proc. Am. Acad. 8: 193. 1870; Wats. U. S. Geol. Surv. Fortieth Parallel [Bot. King's Exp.] 5: 484. 1871; Wats. Proc. Am. Acad. 12: 270. 1877; Wats. Botany [of California] 2: 35, 481. 1880; Parry, Proc. Davenp. Acad. Sci. 4: 56. 1884; Greene, Fl. Francis. 154. 1891; Jepson, Fl. Calif. 391. 1914; Jepson, Man. Fl. Pl. Calif. 296. 1923.

Erect plants, 1-2.5 dm. tall; stem solitary, slender, spreading hirsute; leaves basal, sessile or short-petiolate, lanceolate to oblanceolate, 1-2 cm. long, spreading hispid-hirsute; bracts similar to the leaves, verticillate, very commonly a medial caudine whorl present, upper acerose and hispid; inflorescence of terminal, solitary or umbellately arranged, dense cymose clusters of involucres; the involucres 4.5-5 mm. long, tube prominently 6-ribbed, slightly contracted at the throat, cross-corrugated, about 4 mm. long, pubescence of spreading, hispid hairs, these chiefly on the ribs, the 6 teeth similar, short, recurved or uncinate, united by a white membrane, this lobed, but extended through the sinuses; flower shortly pedicellate, included, subcylindric, 4-4.5 mm. long, outer segments broadly obovate, obcordate to bilobed, 2-2.5 mm. long, inner similar but a little narrower and shorter; stamens 9, anthers oblong, 0.75 mm. long.

Type: "Valley of the Sacramento," Hartweg 1937 (K).

Distribution: inland in northern and central California.

Specimens examined:

CALIFORNIA: SHASTA COUNTY—near Redding, May 30, 1905, Heller 7910a (M, Ph, US); Anderson, May 27, 1915, Smith (CAS); BUTTE COUNTY—Dead Man's Grade, May, 1879, Austin (Pom); Chico, May, 1882, Parry (M, Par, US); Chico, 1887, Parry (M, Par); SUTTER COUNTY—Marysville Buttes, May 17, 1902, Heller & Brown 5568 (D, M, Ph, Pom, US); LAKE COUNTY—volcanic sand flats, Kelseyville,

June 8, 1929, *Blankinship* (M); ELDORADO COUNTY—1884, *Curran* (D); Simpson's Ranch, May 29, 1907, *K. Brandegee* (Pom); CALAVERAS COUNTY—Wallace, June 4, 1914, *McMurphy* (D); MADERA COUNTY—Raymond, May 8, 1900, *Congdon* (D); Raymond, May 8, 1925, *Eastwood* 12558 (CAS, Pom); FRESNO COUNTY—June, 1881, *Parry* 264 (Par); COUNTY NOT KNOWN—1853–1854, *Bigelow* (Ph, US); Sacramento Valley, 1882, *Parry* (US); Sweetwater Creek, May 29, 1907, *K. Brandegee* (Pom).

C. stellulata is the most aberrant member of the Pungentes, the bilobed perianth lobes and the hirsute pubescence being unusual. The inflorescence and continuous (though deeply lobed) margins of the involucres are suggestive of relationship with *C. Douglasii*. It is the only inland species of the subsection.

Subsection 2. STATICOIDEAE, new subsection. Erect or decumbent plants, the characteristic pubescence of the stems at first directed downward, and then abruptly appressed; leaves basal; bracts opposite or, rarely, some of the foliaceous ones verticillate. Involucres 6-ribbed, 6-toothed, the anterior a little longer, margins not membranous. Perianths scantily pubescent, lobes mostly entire, occasionally conspicuously fimbriate, outer longer than the inner. Stamens usually 9, inserted at the base of the perianth. Species 18–26, incl.

Range: Los Angeles County, California, and country immediately adjacent eastward, north through Kern and Monterey Counties, and south to Lower California.

18. *Chorizanthe staticoides* Benth. Trans. Linn. Soc. Lond. 17: 418. 1836; Benth. in DC. Prodr. 14: 25. 1857, excluding *C. discolor*; Torr. & Gray, Proc. Am. Acad. 8: 195. 1870, in part, excluding *C. discolor* and Xantus collection; Wats. U. S. Geol. Surv. Fortieth Parallel [Bot. King's Exp.] 5: 484. 1871; Wats. Proc. Am. Acad. 12: 271. 1877, excluding plants from San Diego; Wats. Botany [of California] 2: 37. 1880, excluding plants from San Diego; Parry, Proc. Davenp. Acad. Sci. 4: 59. 1884, as to description in part, and excluding synonymy and part of range; Dammer in Engl. & Prantl, Nat. Pflanzenfam. 3^{1a}: 12. 1891; Greene, Fl. Francis. 157. 1891; Hall, Univ. Calif. Publ. Bot. [Botanical Survey San Jacinto Mountain] 1: 72. 1902, as to name only; Abrams, Fl. Los Angeles & Vicinity, 113. 1904, and ed. 2. 104. 1917; Jepson, Fl. Calif. 393.

1914, in part, excluding synonymy except *C. nudicaulis*, and not as to plants of "upper San Joaquin valley"; Davidson & Moxley, Fl. So. Calif. 113. 1923, as to part of range; Jepson, Man. Fl. Pl. Calif. 297. 1923, as to coastal plants and including variety; Millspaugh & Nuttall, Publ. Field Mus. Nat. Hist. Bot. [Fl. Santa Catalina Island] 5: 83. 1923.

Pl. 1, figs. 6-7.

Chorizanthe staticoides Benth. var. *nudicaule* (Nutt.) Jepson, Fl. Calif. 394. 1914; Jepson, Man. Fl. Pl. Calif. 297. 1923.

Chorizanthe nudicaulis Nutt. Jour. Acad. Phila. N. S. 1: 166. 1848; Benth. Pl. Hartweg. 332. 1849, as to name only; Benth. in DC. Prodr. 14: 25. 1857, in synonymy; Torr. & Gray, Proc. Am. Acad. 8: 195. 1870, in synonymy; Davidson & Moxley, Fl. So. Calif. 113. 1923.

Erect plants, 1-3 dm. tall, reddish at maturity; stem 1 to several from the base, appressed pubescent, often trichotomously branched at the first node; leaves petiolate, oblanceolate, rounded and emarginate, 2-6 cm. long, tomentose beneath, curly pubescent above; bracts acerose; inflorescence a more or less flat-topped cyme, the involucres aggregated in dense clusters; involucres subcylindric or sometimes contracted above the middle, 3.5-4 mm. or more long, curly pubescent, the teeth spreading and the spines uncinate, the alternate 3 teeth much shorter; flower obconic, about 4 mm. long, outer lobes oblong to elliptic, obtuse, nearly as long as the tube, inner a half to two-thirds as long and narrower; stamens 9, anthers oblong-orbicular.

Type: "Nova California," coll. of 1833, *Douglas* (K).

Distribution: coastal from Monterey County southward to Orange County, California.

Specimens examined:

CALIFORNIA: MONTEREY COUNTY—mountains behind Monterey, September, 1877, *Hooker & Gray* (G); Monterey, 1877, *Hooker & Gray* (G); Tassajara Hot Springs, June, 1901, *Elmer 3251* (D, M, US); Burro Trail, Santa Lucia Mts., June 9, 1909, *K. Brandeges* (D, M, RMt, US); Tassajara Springs, June 1, 1917, *Kelley* (CAS); SAN LUIS OBISPO COUNTY—dry hill, Arroyo Grande, 1860-1862, *Brewer 445* (G, US); Santa Barbara, *Gambel* (M photograph, Ph TYPE of *C. nudicaulis*); 1865, *Torrey 433* (G, US); Santa Barbara, 1874, *Monks 36* (Ph); Hot Springs, June 5, 1896, *Dudley* (D); Santa Barbara, August 21, 1904, *Abrams 4116* (D, Pom); *Bloch-*

man's Ranch, June 17, 1906, *Eastwood* 459 (CAS, US); Zaca Lake Forest Reserve, June 19-30, 1906, *Eastwood* 658 (CAS); Painted Cave Ranch, May 9, 1908, *Eastwood* 107 (US); SAN BERNARDINO COUNTY—San Bernardino, 1876, *Parry* (G); 1876, *Parry & Lemmon* 369 (CAS, M, Par); near San Bernardino, 1880, *Parish* (M); foothills of San Bernardino Mts., May 1, 1885, *Parish Bros.* 667 (D, US); San Bernardino Mts., alt. 2500 ft., June 13, 1894, *Parish* 3217 (US); dry mesas, alt. about 300 m., San Bernardino Valley, June 2, 1919, *Parish* 19294 (CAS, D, G); RIVERSIDE COUNTY—Glen Ivy Trail to Santiago Peak, Santa Ana Mts., alt. 3700 ft., June 14, 1923, *Munz & Keck* 7066 (Pom, RMT); LOS ANGELES COUNTY—North Fork San Gabriel, alt. 500 m., May 5, 1878, *Leiberg* 331a (US); Los Angeles, 1884, *Nevin* 18 (G); Santa Catalina Island, 1885, *Lyon* (G); June, 1887, *Parish* 1999 (D, Par); June, 1888, *Hasse* (ISC); Newhall, June 3, 1893, *Hasse* (D); dry upland slopes, Avalon, Santa Catalina Island, June, 1897, *Trask* (M, US); hills near Inglewood, April, 1899, *Abrams* 205 (D); Garvanza, April 8, 1900, *Grant* (D); Santa Monica Mts., alt. 800 ft., April 3, 1901, *Abrams* 1274 (D, Pom); San Jose Hills, near Claremont, alt. 900 ft., April 5, 1901, *Parish* 594 (D); Laurel Cañon, April 7, 1901, *Grant* (D); dry ground, May, 1901, *Grant* (ISC); Oak Knoll, May 5, 1901, *Braunton* 15 (US); Glendora, May 5, 1902, *Braunton* (D); Glendora, May 5, 1902, *Braunton* 306 (US); Glendora, May 14, 1902, *Grant* (D); Sherman, May 27, 1902, *Braunton* 275 (US); Elysian Park, June 1, 1902, *Braunton* 418 (US); Sepulveda Canyon, Santa Monica Mts., June 16, 1902, *Abrams* 2554 (D, G, M, Ph, Pom, US); dry hillsides, Sierra Madre, July 2, 1902, *Abrams* 2637 (D, G, M, Pom); Garvanza, May, 1903, *Sheldon* (E); hills near Claremont, May, 1904, *Baker* 4706 (M, Pom, US); Altadena, June 17, 1904, *Grant* (D); Pasadena, June 17, 1904, *Grant* 169 (CAS, D, M, Ph, Pom, RMT); Pasadena, May 18, *Grant* 3887 (D); Tujunga Wash, July 6, 1905, *Grinnell* 497 (US); Garvanza, May 27-June 10, 1906, *Eastwood* 10 (CAS, US); Roscoe, June 5, 1906, *Eastwood* 245 (CAS); Claremont Wash, May 25, 1910, *Davis* 51 (M); San Fernando Wash, May 11, 1913, *Eastwood* 3144 (CAS); dry roadside, Azusa, June 22, 1915, *Macbride & Payson* 717 (G, RMT); rocky hillside, Griffith Park, July 12, 1915, *Macbride & Payson* 815 (G, RMT); near Acton, June 12, 1918, *Ferris* 953 (D); gravelly wash, near Claremont, May 14, 1919, *Munz* 2791 (D, Pom); Sepulveda Canyon, Santa Monica Mts., alt. 800 ft., May 15, 1920, *Munz & Harwood* 3994 (D, Ph, Pom, RMT), Mt. Wilson, June, 1921, *Blasio* (CAS); Griffith Park, May 15, 1925, *C. & M. Epling* (M); Sevaine Flats, San Antonio Mts., alt. 3000 ft., July 10, 1925, *Johnston* (Pom); mountains near Claremont, May 21, 1926, *Jones* (CAS, D, US); Mandeville Canyon, alt. 200-1000 ft., April 20, 1928, *Bryan* 76 (Pom); dry ridge, Little Santa Anita Canyon, alt. 2100 ft., May 30, 1928, *Ewan* 1526 (E); Little Santa Anita Canyon, alt. 1600 ft., May 30, 1928, *Ewan* 1527 (E); Claremont, June 15, 1928, *Eastwood* 15379 (CAS); Santa Monica Mts., alt. 1825 ft., May 25, 1929, *Ewan* 1509 (E); hills along Ridge Route at Sandberg's, June, 1929, *Clark* (CAS); Tuna Canyon above Roscoe, alt. 1000 ft., June 7, 1929, *MacFadden* 8 (E); Glendale, alt. 1000 ft., June 8, 1929, *Fisher* 142 (US); trail to Barley Flats, San Gabriel Mts., alt. 5000 ft., July 10, 1929, *Ewan* 1507 (E); gravelly slope, Mint Canyon, May 19, 1930, *Hoffmann* (CAS, E); gravelly slope, near Castaic, May 19, 1930, *Hoffmann* (CAS, E); between Coldbrook and Pine Flats, San Gabriel Mts., June 28, 1930, *Crow* (E); Santa Susana Pass, May 29, 1931, *Howell* (Pe); Santa Susana Pass, May 29, 1931, *Howell* 6585 (CAS); San Gabriel Wash, May 31, 1931,

Howell 6621 (CAS); San Gabriel Wash, May 31, 1931, *Howell 6621a* (CAS); Thompson Creek Dam near Claremont, alt. 1600 ft., May 27, 1932, *Wheeler 764* (M); dry decomposed granite bank, upper Topango Canyon, Santa Monica Mts., July 7, 1933, *Epling & Ewan 7599* (M); dry grassy ridges, east end of Barley Flats, San Gabriel Mts., alt. 5300 ft., July 23, 1933, *Dunn & Ewan 7838* (M); ORANGE COUNTY—Santiago, June, 1899, *Bowman* (D); Mt. Santiago, June, 1901, *Abrams 1807* (D, Pom); hills near Santa Ana, Spring, 1902, *Geis 542* (D); bluffs along shore, Laguna Beach, May 5, 1916, *Crawford* (M, Pom, US); southern Puente Hills in the Santa Ana Cañon, alt. 1600 ft., June 8, 1927, *Howell 2455* (CAS); southern Puente Hills, Santa Ana Cañon, alt. 750 ft., June 8, 1927, *Howell 2461* (CAS); COUNTY NOT KNOWN—1833, *Douglas* (G, K TYPE, M photograph, US photograph); Cassitas Pass, alt. 550 ft., July, 1875, *Rothrock 168* (G, US); 1881, *Parry* (M, US).

C. staticoides has been a troublesome species, and even as delimited above it is a variable one. Of the several specific names which have at one time or another been placed in synonymy under *C. staticoides*, the author thinks that but one, *C. nudicaulis* Nutt., can remain there. *C. nudicaulis* has been recognized by some authors in recent years, either specifically or varietally, on the ground that it possesses green stems and white flowers. These characters frequently attend young specimens of *C. staticoides*. Indeed, on somewhat older specimens, both reddish and green involucres and stems and both red and white flowers may be found on the same plant. These characters accredited to *C. nudicaulis* can certainly not be detected in the type collection.

The variation in the perianth lobes from oblong to elliptic seems to be of no significance, nor is the slight variation in length and degree of divergence of the involucral teeth. Variations of importance have been detected, however, and these are described below as subspecific entities.

18a. *Chorizanthe staticoides* Benth. forma *bracteata* Goodman, n. form.³¹

Lower bracts foliaceous and persistent. Otherwise as the species.

Type: Red Reef Canyon, Topatopa Mts., Ventura County,

³¹ *Chorizanthe staticoides* Benth. forma *bracteata* Goodman, forma nov., bracteis inferioribus foliaceis et persistantibus. Cetera speciei similis.—Red Reef Canyon, Topatopa Mts., Ventura County, California, alt. 2800–3500 ft., June 8, 1908, *Abrams & McGregor 146* (D TYPE).

California, alt. 2800-3500 ft., June 8, 1908, *Abrams & McGregor* 146 (D).

Distribution: Ventura and Los Angeles Counties, California.

Specimens examined:

CALIFORNIA: VENTURA COUNTY—Santa Paula, 1887-1888, *Parry* (M, Par); Red Reef Canyon, Topatopa Mts., alt. 2800-3500 ft., June 8, 1908, *Abrams & McGregor* 146 (D TYPE, G, M photograph, US); Camarilla, April 27, 1926, *Jones* (Pom); LOS ANGELES COUNTY—Los Tunas Cañon, Santa Monica Mts., May, 1901, *Abrams* 1708 (D, Pom).

This form constitutes a minor entity, and gains recognition partly because it seems localized in the northwest portion of the center of distribution for the species.

18b. *Chorizanthe staticoides* Benth. var. *brevispina* Goodman, n. var.³²

Stem usually 1 to few from the base; teeth of the involucre very short, consisting of hardly more than the short, recurved or uncinate spines. Otherwise as the species.

Type: sandy soil near Deer Park, Monrovia Canyon, San Gabriel Mts., Los Angeles County, California, June 10, 1928, *J. T. Howell* 3876 (M).

Distribution: western San Bernardino County and Los Angeles County, California.

Specimens examined:

CALIFORNIA: SAN BERNARDINO COUNTY—City Creek road to Big Bear Lake, alt. 6000 ft., July 28-30, 1930, *Goodman & Hitchcock* 1748 (M); LOS ANGELES COUNTY—north Fork San Gabriel, alt. 500 m., May 5, 1878, *Leiberg* 3381b (US); hills, Los Angeles, April 22, 1888, *Hasse* (M); May, 1901, *Grant* 3887 (US); Mt. Lowe, July 24, 1901, *Williamson* (Ph); Pasadena, June 28, 1902, *Jones* (Pom); San Gabriel Wash, alt. 500 ft., May 13, 1917, *Johnston* 27P (Pom); Altadena, alt. 1500 ft., June 30, 1917, *Grinnell* (D); Barley Flats, San Gabriel Mts., alt. 5600 ft., July 8, 1917, *Grinnell* (D, Pom); San Gabriel Canyon, May 29, 1919, *Eastwood* 8963 (CAS, G); Mt. Wilson, June 20, 1919, *Eastwood* 9045 (CAS); San Gabriel Mts., alt. 3000 ft., June 30, 1924, *Dobbs* (Pe); San Antonio Mts., alt. 4700 ft., July 8, 1925, *Johnston* (Pom); Deer Park, Monrovia Canyon, San Gabriel Mts., June 10, 1928, *Howell* 3876 (CAS, M TYPE); near Lake Hollywood, Santa Monica Mts., alt.

³² *Chorizanthe staticoides* Benth. var. *brevispina* Goodman, var. nov. caulis solitarius aut paucis e base; involucri dentibus brevissimis, vix plus spinis brevibus recurvatis aut uncinatis. Cetera speciei similis.—Sandy soil near Deer Park, Monrovia Canyon, San Gabriel Mts., Los Angeles County, California, June 10, 1928, *J. T. Howell* 3876 (M TYPE).

1000 ft., May 30, 1930, *Ewan 2244* (E, Pe); gravelly ground, Tujunga Canyon, San Gabriel Mts., June 12, 1932, *Ewan 7365* (E); San Dimas Cañon, San Gabriel Mts., alt. 1800 ft., June 12, 1932, *Wheeler 821* (M); gravelly chaparral slope, Upper Millards Canyon, San Gabriel Mts., alt. 3700 ft., July 4, 1932, *Ewan 7586* (M).

18c. *Chorizanthe staticoides* Benth. var. *elata* Goodman, n. var.³⁸

Erect plants; stems few from the base, 3.5–5 dm. tall; leaves petiolate, oblong to oblanceolate, obtuse to emarginate, 8–10 cm. long, thinly tomentose beneath, sparsely villous above; lower bracts frequently foliaceous, oblanceolate to lanceolate, upper much reduced; involucres in small clusters at the ends of the branches of a loose cyme, similar to those of the species; mature flowers not seen; stamens 9.

Type: dry ridge in chaparral belt, Glen Ivy trail to Santiago Peak, Santa Ana Mountains, Riverside County, California, alt. 4800 ft., June 14, 1923, *Munz 7085* (Pom.)

Distribution: western San Bernardino and Riverside Counties and westward, California.

Specimens examined:

CALIFORNIA: SAN BERNARDINO COUNTY—Arrowhead Hot Springs, alt. 1600 ft., May 7, 1919, *Spencer 1102* (CAS, Pom); RIVERSIDE COUNTY—dry ridge, Glen Ivy trail to Santiago Peak, Santa Ana Mts., alt. 4800 ft., June 14, 1923, *Munz 7085* (M photograph, Pom TYPE); LOS ANGELES COUNTY—dry hills, April 22, 1888, *Hasse* (US); San Dimas Canyon, alt. 1500 ft., April 21, 1920, *Munz & Harwood 3715* (Pom, RMt, US); San Dimas Canyon, alt. 1500 ft., May 2, 1920, *Munz & Harwood 3822* (Pom, US); Arroyo Seco, Pasadena, May, 1925, *C. & M. Epling* (M); Griffith Park, alt. 1050 ft., April 26, 1930, *Ewan 2252* (E).

No mature plants of this variety have been seen, and it may be found, upon the study of further collections, that this entity is a distinct species. However, in the lack of complete knowledge of the morphology of the plants, and because they do not have a separate range, nor, so far as collections now show, do

"*Chorizanthe staticoides* Benth. var. *elata* Goodman, var. nov. Planta erecta; caulis paucis e base, 3.5–5 dm. altis; foliis petiolatis, oblongis vel oblanceolatis, obtusis vel emarginatis, 8–10 cm. longis, subter parce tomentosis, supra sparse villosis; bracteis inferioribus saepe foliaceis, oblanceolatis vel lanceolatis, superioribus multum minoribus; involucris in glomerulis parvis ad terminos ramorum cymae laxae, speciei similibus; floribus maturis non visis; staminibus 9.—Dry ridge in chaparral belt, Glen Ivy trail to Santiago Peak, Santa Ana Mountains, Riverside County, California, alt. 4800 ft., June 14, 1923, *Munz 7085* (Pom TYPE).

they form an aspect of the range of the parent species, they are considered as constituting a variety.

18d. *Chorizanthe staticoides* Benth. var. *latiloba* Goodman,
n. var.³⁴

Diffuse ascending plants; outer lobes of the perianth obovate and truncate, 2 mm. long, inner oblanceolate and truncate, about two-thirds as long. Otherwise as in the species.

Type: Acton, Los Angeles County, California, June, 1902,
Elmer 3689 (M).

Distribution: probably only from Los Angeles County, California.

Specimens examined:

CALIFORNIA: LOS ANGELES COUNTY—Rock Creek, June, 1886, *Parish 1986* (D, Par); San Francisquito Cañon, June, 1887, *Parish Bros. 1988* (M); San Francisquito Cañon, June, 1887, *Parish 1988* (D, Par); Acton, June, 1902, *Elmer 3689* (D, G, M TYPE, Pom, US); Newhall, May 15, 1916, *Evermann* (CAS); Mint Cañon, alt. 1500 ft., June 15, 1918, *Pearson 26* (Pe); Little Rock Creek, San Gabriel Mts., alt. 3500 ft., May 20, 1921, *Pearson 5342* (E, Pe); COUNTY NOT KNOWN—hills bordering Mojave Desert, May 24, 1882, *Pringle* (Ph); hills bordering Mojave Desert, May 25, 1882, *Pringle* (Ph, US).

19. *Chorizanthe chrysacantha* Goodman, n. sp.³⁵

Pl. 3, fig. 2.

Plants erect, 1–2 dm. tall; stems trichotomously branched at first node, canescent with appressed pubescence; leaves petiolate, oblong, obtuse to emarginate, 3–4 cm. long, tomentose be-

"*Chorizanthe staticoides* Benth. var. *latiloba* Goodman, var. nov. Planta diffusa vel adscendens; perigonii lacinias exterioribus obovatis et truncatis, 2 mm. longis, 1½ plo longioribus quam interioribus, interioribus oblanceolatis et truncatis. Cetera speciei similis.—Acton, Los Angeles County, California, June, 1902, *Elmer 3689* (M TYPE).

"*Chorizanthe chrysacantha* Goodman, sp. nov. Planta erecta, 1–2 dm. alta; caulinus ad primum nodum trichotome ramosis, canescentibus, appresso pubescentia; foliis petiolatis, oblongis, obtusis vel emarginatis, 3–4 cm. longis, subter tomentosis, supra pubescentibus vel glabris; bracteis parvis, subulatis; inflorescentia in glomerulis paucis magnis densis disposita; involucris subcylindricis, circiter 5 mm. longis, tubo 4 mm. longo, pubescente, interdum transverso-corrugato, dentibus divergentibus, spinis brevibus recurvatis vel uncinatis; floribus cylindricis, 5–5.5 mm. longis, lobis exterioribus late elliptico-ovatis, obtusissimis, plus 2 mm. longis, interioribus ellipticis vel oblongis, 0.5 mm. brevioribus; staminibus 9, antheris elliptico-oblongis.—Bluffs along coast, Laguna Beach, Orange County, California, alt. 50 ft., April 17, 1920, *Munz & Harwood 3775* (Pom TYPE).

neath, pubescent to glabrate above; bracts small, subulate; inflorescence of a few large, dense cymose clusters; involucres subcylindric, about 5 mm. long, the tube 4 mm. long, pubescent, sometimes cross-corrugated, the teeth divergent, the short spines down-curved to uncinate; flower cylindric, 5-5.5 mm. long, outer lobes broadly elliptic-ovate, very obtuse, over 2 mm. long, inner elliptic to oblong, 0.5 mm. shorter; stamens 9, anthers elliptic-oblong.

Type: bluffs along coast, Laguna Beach, Orange County, California, alt. 50 ft., April 17, 1920, *Munz & Harwood* 3775 (Pom.).

Distribution: known only from Orange County, California.

Specimens examined:

CALIFORNIA: ORANGE COUNTY—bluffs along coast, Laguna Beach, alt. 50 ft., April 17, 1920, *Munz & Harwood* 3775 (M photograph, Pom TYPE); on sea bluffs, Laguna, May 31, 1924, *Peterson* 4644 (Pe); COUNTY NOT KNOWN—"sea side form," April, 1881, *Parry* 271 (G).

The range of this species, it will be noticed, lies just to the south of that of its relative, *C. staticoides*. The size of the involucres in the large dense clusters makes the species easily recognizable. Except at late maturity, the involucral teeth are golden or amber-yellow.

19a. *Chorizanthe chrysacantha* Goodman var. *compacta* Goodman, n. var.³⁶

Stems more numerously branched, densely pubescent; the dense clusters of involucres closely aggregated; involucral teeth very short. Otherwise similar to the species.

Type: Bench Bluff, between Laguna and Newport, Orange County, California, April 27, 1928, *Reed* 5700 (Pom.).

Distribution: known only from Orange County, California.

Specimens examined:

CALIFORNIA: ORANGE COUNTY—Bench Bluff, between Laguna and Newport, April 27, 1928, *Reed* 5700 (M photograph, Pom TYPE).

³⁶ *Chorizanthe chrysacantha* Goodman var. *compacta* Goodman, var. nov., caulis numerosius ramosus quam in specie, dense pubescentibus; involucris in glomerulis densis aggregatis, involueri dentibus brevissimis. Cetera speciei similis.—Bench Bluff, between Laguna and Newport, Orange County, California, April 27, 1928, *Reed* 5700 (Pom TYPE).

The compact habit, resulting from short internodes and the more frequently branched stems, gives the variety a very different appearance than the species.

20. **Chorizanthe Xanti** Wats. Proc. Am. Acad. 12: 272. 1877; Wats. Botany [of California] 2: 37, 481. 1880; Parry, Proc. Davenp. Acad. Sci. 4: 59. 1884; Greene, Fl. Francis. 157. 1891; Abrams, Fl. Los Angeles & Vicinity, 114. 1904, except as to stated range; Jepson, Fl. Calif. 394. 1914, in synonymy.

Ascending to spreading plants, branched at or near the base; stems 0.5–3 dm. long, gray-pubescent, sometimes sparsely so; leaves petiolate, broadly ovate to oblong, 2–5 cm. long, tomentose beneath, short-villous above; lower bracts foliaceous, similar to the leaves, or lanceolate, upper acerose; inflorescence of congested, more or less flat-topped cymes, the involucres appearing singly in the axils or in small clusters; involucres 4.5–6 mm. long, the tube cylindric, about 4 mm. long, densely pubescent, the teeth widely divergent, the anterior tooth not detectably longer, the spines recurved to uncinate; flower subcylindric, 5–6 mm. long, outer lobes oblong-linear to elliptic, 2 mm. or more long, inner linear-oblong, a little shorter; stamens 9, anthers short-oblong.

Type: near Fort Tejon, Kern County, California, "C. L. Xantus" (G).

Distribution: Kern County to Riverside County, California, and adjacent counties to the westward.

Specimens examined:

CALIFORNIA: KERN COUNTY—Fort Tejon and vicinity, 1857–1858, *Xantus de Vesey* (US isotype); in Owens Valley and at Fort Tejon, 1863, *Horn* (US); Tehachapi, May, 1883, *Parry* (M); Fort Tejon, June, 1887, *Parish* 1989 (D, Par); near Caliente, alt. 800–1100 m., June 24, 1891, *Coville & Funston* 1100 (D, US); Bakersfield, May 2, 1896, *Davy* 1882 (RMt); Tejon Pass, June 16, 1896, *Dudley & Lamb* 4556 (US); Keene, alt. 1700 ft., May 22, 1903, *Jones* (Pom.); Bakersfield, May 23, 1903, *Jones* (Pom); east slope of Greenhorn Range, alt. 4000 ft., June 2–10, 1904, *Hall & Babcock* 5081 (D); McKittrick, April 29, 1905, *Heller* 7797 (D, M, Ph, US); Johnson Canyon, Walker Basin, June 5, 1905, *Grinnell* 110 (US); near Havilah, June 11, 1905, *Grinnell* 194 (US); near Havilah, June 15, 1905, *Grinnell* 288 (US); vicinity of Fort Tejon, alt. 3200 ft., June 16–17, 1908, *Abrams & McGregor* 305 (D); hills, Bakersfield, alt. 2000 ft., May 25, 1926, *Ford* (D); Tehachapi Mts., June 1, 1926, *Weston* 184 (CAS); gravelly slope, Frazier Mountain Park,

May 25, 1928, Hoffmann (Pom); dry slopes, Tehachapi Grade, alt. 1000 ft., May 17, 1929, Muns 11426 (Pom); dry hills, Caliente, April 28, 1930, Hoffmann (CAS); rocky slope, near Kernville, alt. 2770 ft., May 13, 1930, Howell 5034 (CAS); SAN BERNARDINO COUNTY—San Bernardino, 1876, Parry (M); 1876, Parry & Lemmon 368 (CAS, M, Ph, US); April, 1876, Lemmon (US); San Bernardino, May, 1885, Parish 367 (US); mouth of Santa Ana Cañon, San Bernardino Mts., May 1, 1885, Parish 601 (D); San Bernardino, May 1, 1885, Parish 638 (US); Yueaipé, San Bernardino Mts., alt. 2500 ft., June 13, 1894, Parish 3217a (US); vicinity of San Bernardino, alt. 500 ft., May 11, 1901, Parish 4771 (D, US); Palm Cañon, Palm Springs, April 30, 1913, Eastwood 3100 (CAS); Lytle Creek, San Gabriel Mts., alt. 5000 ft., July 18, 1921, Peirson 2501 (Pe); RIVERSIDE COUNTY—San Gorgonio, Parry (Par); SAN LUIS OBISPO COUNTY—on Cuyama Valley Road, about 62 miles east of the Coast Boulevard, May 18, 1929, Peirson 8402 (Pe); SANTA BARBARA COUNTY—Carpinteria, April 6, 1929, Jones (Pom); VENTURA COUNTY—valley below Cuddys, Mt. Pinos region, June 15–16, 1896, Dudley & Lamb 4556 (D, Pom); LOS ANGELES COUNTY—Los Angeles, 1881, Parry (M); Elizabeth Lake, July 2, 1905, Grinnell 450 (US); Lone Pine Cañon, San Antonio Mts., alt. 3500 ft., May 30, 1921, Peirson 2419 (Pe, Pom); Lone Pine Canyon, alt. 5000 ft., June 17, 1921, Muns 4654 (Pom); sandy slope, Elizabeth Lake, May 22, 1929, Hoffmann (E); gravelly soil, trail to Barley Flats, San Gabriel Mts., alt. 4800 ft., July 10, 1929, Ewan 1508 (E); COUNTY NOT KNOWN—hills bordering on the Mojave Desert, May 25, 1882, Pringle (US); 1883, Parry (M, US); North Fork of Kern River, alt. 750 m., June 22, 1931, Coville & Funston 1033 (US); sunny slopes, Erskine Creek, alt. 4000–5000 ft., April–September, 1897, Purpus 5027 (M, US.)

As will be noticed from the description, *C. Xanti* has several characters which separate it from related species. The ovate leaves constitute an excellent character, although these are sometimes lacking in herbarium specimens. The foliaceous bracts and the usually white-pubescent and long involucres are characteristic. Further, the inflorescence of *C. Xanti* does not consist of dense, spherical clusters of involucres, but rather of conglomerate cymes composed of groups of 1 to few, erect involucres.

20a. *Chorizanthe Xanti* Wats. var. *leucotheca* Goodman, n. var.³⁷

Smaller plants; the involucres white-tomentose. Otherwise as the species.

Type: Whitewater, Riverside County, California, May 11, 1903, Jones (Hb. Pom. College 122122).

³⁷ *Chorizanthe Xanti* Wats. var. *leucotheca* Goodman, var. nov. *Planta speciei similis sed brevior; involucris albo-tomentosis.*—Whitewater, Riverside County, California, May 11, 1903, Jones (Hb. Pom. College 122122 TYPE).

Distribution: western San Bernardino and Riverside Counties, California, and possibly adjacent counties to the westward.

Specimens examined:

CALIFORNIA: SAN BERNARDINO COUNTY—Lytle Creek, San Gabriel Mts., alt. 3500 ft., May 18, 1920, Peirson 1772 (CAS, Pe); RIVERSIDE COUNTY—near Cabazon, April, 1891, Orrott (M); Whitewater, May 11, 1903, Jones (M photograph, Pom 122122 TYPE); Palm Spring, alt. 2000 m., April 19, 1906, Parish 6168 (D); Whitewater, April, 1914, Peirson 1776 (Pe); Snow Creek, alt. 1000 ft., April 10, 1922, Jaeger (D); Mission Creek Wash, April 15, 1926, Jaeger (Pom); Whitewater Canyon, alt. 1500 ft., Spring, 1929, Clary (E); dry flat, near Cabazon, May 1, 1930, Munro 11919 (Pom.)

The writer is particularly indebted to Mr. J. A. Ewan, of Los Angeles, for additional material of this variety. Mr. Ewan had also detected this new variety and was preparing to publish on it when he heard that the group was undergoing revisional treatment, whereupon he placed his entire collection of the genus in the hands of the writer.

21. *Chorizanthe leptotheca* Goodman, n. sp.³⁸

Chorizanthe staticoides Benth. acc. to Hall, Univ. Calif. Publ. Bot. [Botanical Survey San Jacinto Mountain] 1: 72. 1902, and of several other authors in part.

Erect to diffuse reddish plants, stem 1 to several from the base, slender, 1-2 dm. long, scantily pubescent; leaves slender-petiolate, obovate to oblong or oblanceolate, 2-4 cm. long, the blades sometimes but a few millimeters long, tomentose beneath, villous above; upper bracts acerose; inflorescence a rounded, loose cyme, the involucres in small, loose clusters; involucres slender, 4 mm. long, tube nearly as long, curly pu-

³⁸ *Chorizanthe leptotheca* Goodman, sp. nov. Planta erecta vel diffusa, rosea; caulinibus solitariis vel pluribus e base, 1-2 dm. longis, sparse pubescentibus; foliis tenui-petiolatis, obovatibus vel oblongis vel oblanceolatis, 2-4 cm. longis, laminis interdum modo paucis millimetribus longis, subter tomentosis, supra villosis; bracteis superioribus acerosis; inflorescentia cyma rotundata laxa; involucris tenuibus, 4 mm. longis, in glomerulis parvis laxis, tubum paulo superantibus, crispopubescentibus, dentibus patulis et uncinatis; floribus valde exsertis, cylindricis, 4.5-5 mm. longis, tube circiter 3 mm. longo, lobis exterioribus linearibus, obtusis, interioribus linear-lanceolatis, vix plus $\frac{1}{2}$ longitudine; staminibus 9, antheris oblongo-orbicularibus.—Dry hills between Ramona and Ballena, San Diego County California, June 19, 1903, Abrams 3777 (M TYPE).

bescent, the teeth spreading and uncinate; flower well exserted, perianth cylindric, 4.5–5 mm. long, tube about 3 mm. long, outer lobes linear, obtuse, inner linear-lanceolate, scarcely more than half as long; stamens 9, anthers oblong-orbiculare.

Type: dry hills between Ramona and Ballena, San Diego County, California, June 19, 1903, Abrams 3777 (M).

Distribution: western Riverside County, California, southward into Lower California.

Specimens examined:

CALIFORNIA: RIVERSIDE COUNTY—San Jacinto Mt., alt. 5000 ft., July 29, 1897, Hall 745 (US); Elsinore, May, 1901, Mrs. J. D. Abrams (D); San Jacinto, alt. 1800 ft., May 28, 1921, Spencer 1716 (G); MacMullen Trail, San Jacinto Mts., June 14, 1921, Spencer 1715 (G); MacMullen Trail, San Jacinto Mts., June 14, 1922, Jaeger (D, US); near Idyllwild, San Jacinto Mts., alt. 6000 ft., June 24, 1922, Spencer 1975 (Pom); dry slopes, Aguanga Valley, May 20, 1925, Muns 9843 (Pom); Aguanga, May 20, 1925, Peirson 6012 (Pe); dry slope, near Coahuila, May 21, 1927, Muns 10879 (Pom); dry sandy soil on road to Hemet, San Jacinto Mt., alt. about 4500 ft., August 2, 1927, Howell 2926 (CAS); SAN DIEGO COUNTY—San Diego, May 1, 1862, Cooper 523 (US); Valle de las Viejas, June, 1877, Cleveland (G); Campo, June, 1880, Vasey 543 (US); Oak Grove, 1880, Vasey 543a (US); Witch Creek, June, 1894, Alderson (D, G); dry hills between Ramona and Ballena, June 19, 1903, Abrams 3777 (D, G, M TYPE, Ph, Pom, US); Descanso, June, 1910, K. Brandegee (D, US); sandy hillsides, Descanso, alt. 3100 ft., July 22, 1918, Spencer 1022 (G); sandy hills, Mesa Grande, alt. 3300 ft., May 24, 1919, Spencer 1144 (CAS, Pom); near Santa Ysabel, June 29, 1923, Muns & Harwood 7310 (Pom); Laguna Mt., May 22, 1927, Sanford (CAS).

LOWER CALIFORNIA: near U. S. Boundary Mts., July 2, 1884, Orcutt (M, Par, US); dry sandy slope, south of Tecate, May 12, 1925, Muns 9481 (Pom).

It is probable that the lower bracts in this species are foliaceous but early caducous.

Specimens of *C. leptotheca* are recognizable by the loose inflorescence and the slender, red stems and involucres. Representatives of this species have heretofore passed as *C. staticeoides* but the nearest relative is *C. Xanti*.

Orcutt's 1371 from Rosario, Lower California (hbb. Missouri Botanical Garden and Parry) differs from typical *C. leptotheca* in having crenate perianth lobes.

22. Chorizanthe discolor Nutt. Jour. Acad. Phila. N. S. 1: 167. 1848; Benth. in DC. Prodr. 14: 25. 1857, in synonymy; Torr. & Gray, Proc. Am. Acad. 8: 195. 1870, in synonymy.

Ascending to spreading plants; stems few from the base, 1–1.5 dm. long, gray-pubescent; leaves petiolate, the blades oblong, rounded to truncate, emarginate, 1.5–3.5 cm. long, tomentose beneath, lanate to sparsely pubescent above; bracts linear to acerose; inflorescence of medium-sized, dense, cymose clusters; the involucres triangular in cross-section, 4–5 mm. long, the tube short, less than 3 mm. long, curly pubescent, the outer teeth long and spreading, spines straight except for the down-curved to uncinate tips, inner similar but half as long; mature flowers not seen; stamens 9, anthers short-oblong.

Type: "St. Diego," California, *Gambel* (Ph.)

Distribution: San Diego County, California.

Specimens examined:

CALIFORNIA: SAN DIEGO COUNTY—"St. Diego," *Gambel* (G isotype, M photograph, Ph TYPE); San Diego, 1882, *Parry* (M, Par); between Jacumba and Mountain Springs, April 24, 1920, *Eastwood* (CAS).

Probably the nearest relative of *C. discolor* is *C. staticoides*, from which it is separated readily both morphologically and geographically. The round, smaller clusters of involucres and the short involucral tube separate it well, and manifest a closer morphologic resemblance to *C. Breweri*.

An immature flower of *C. discolor*, which was but 2.5 mm. long, had broadly obovate-oblong outer lobes, and ovate-lanceolate inner lobes which were half as long.

23. *Chorizanthe Breweri* Wats. Proc. Am. Acad. 12: 270. 1877; Wats. Botany [of California] 2: 36. 1880; Parry, Proc. Davenp. Acad. Sci. 4: 57. 1884; Greene, Fl. Francis. 155. 1891; Jepson, Fl. Calif. 393. 1914, excluding part of description; Jepson, Man. Fl. Pl. Calif. 297. 1923.

Ascending to decumbent plants; stems few from the base, 1–1.5 dm. long, gray-pubescent; leaves petiolate, blades spatulate to ovate and about 1 cm. long, short villous-pubescent; bracts similar to the leaves or the lamina orbicular, lanceolate or acerose; inflorescence of small, dense, rather remote cymose clusters; involucres subcylindric, 3–4 mm. long, tube nearly as long, pubescent, the teeth short and widely spreading, the short spines down-curved to uncinate; flower 3–3.5 mm. long, the

outer lobes elliptic to broadly obovate-oblong, as long as the tube, inner ovate to orbicular-ovate, 0.5 mm. shorter; stamens 9, anthers oblong.

Type: dry rocky hillsides, San Luis Obispo, California, April, 1861, *Brewer* 456 (G).

Distribution: San Luis Obispo County, California.

Specimens examined:

CALIFORNIA: SAN LUIS OBISPO COUNTY—dry, rocky hillsides, San Luis Obispo, April, 1861, *Brewer* 456 (G TYPE, M photograph, US); San Margarita Valley, *Brewer* 894 (G, Par); Atascadero Ranch, May 1, 1861, *Brewer* 894 (M, US); San Luis Obispo, 1882, *Jones* (G, Par); San Luis Obispo, May, 1882, *Jones* (Ph); San Luis Obispo, May 6, 1882, *Jones* 5234 (CAS, D, M, Pom, RMt, US); Chorro, May, 1909, K. *Brandegee* (US); Chorro Creek, May 17, 1928, *Eastwood* 15116 (CAS); serpentine hills, along Chorro Creek, May 17, 1928, *Eastwood* 15127 (CAS); on stony hills, near San Luis Obispo, May 19, 1928, *Eastwood* 15167 (CAS).

This infrequently collected species seems to constitute a northern offshoot of *C. staticoides*, much as *C. discolor* represents a southern offshoot of the same parent.

The broadly foliaceous, sometimes nearly orbicular bracts of *C. Breweri* are very distinctive. Fortunately, these are fairly persistent.

The occurrence of the involucres in small clusters (1 cm. or less broad), the short appearance of the involucres, caused by the shortness of the teeth, and the short flowers with broad lobes are good diagnostic characters.

In Watson's revision, where the species was originally described, *C. Breweri* is placed near *C. pungens* because the teeth were "united at base by an inconspicuous margin." Such an interdenteate margin occurs in all members of the subsection *Staticoideae* and in many members of subsequent subsections. This membrane does not show a relationship to the characteristic margin on the teeth of the subsection *Pungentes*. In *C. Breweri* the margin is a little larger than usual.

Variation in the shape of the perianth lobes occurs here much as it does in *C. staticoides*.

24. *Chorizanthe Wheeleri* Wats. Proc. Am. Acad. 12: 272. 1877; Wats. Botany [of California] 2: 38. 1880; Parry, Proc.

Davenp. Acad. Sci. 4: 59. 1884, in synonymy; Greene, Fl. Francis. 157. 1891; Jepson, Fl. Calif. 394. 1914, in synonymy.

Chorizanthe staticoides Benth. acc. to Greene, Bull. Cal. Acad. Sci. [Bot. Santa Cruz Island] 2: 411. 1887; T. S. Brandegee, Proc. Cal. Acad. Sci. [Fl. Santa Barbara Islands] II. 1: 216. 1888.

Chorizanthe insularis Hoffmann, Bull. So. Cal. Acad. Sci. 31: 56. 1932.

Erect to spreading plants; stems frequently trichotomously branched at first node, 0.6–2 dm. long, gray-pubescent; leaves petiolate, ovate-spathulate to oblong, 2–3 cm. long, tomentose beneath, short-villous above; foliaceous bracts lanceolate and cuspidate, opposite or occasionally 3 or 4 in a verticil, upper acerose; inflorescence of closely congested terminal clusters, 1–1.5 cm. broad, red at maturity; involucres cylindric, 2.5–3 mm. long, tube the same length, sparsely pubescent to glabrate, and also beset with a few short, thick, upwardly curved, blunt and transparent hairs, teeth short, widely spreading, spines very short, down-curved to uncinate; flower partially exserted, cylindric, 3–3.5 mm. long, lobes entire to subentire, sometimes divergent, outer elliptic-oblong to lanceolate and obtuse, 1.25–1.5 mm. long, inner oval or narrower, a little shorter; stamens 6, anthers oblong.

Type: Santa Barbara, California, July, 1875, *J. T. Rothrock* 62 (G).

Distribution: Santa Barbara County, California—chiefly on the Santa Barbara Islands.

Specimens examined:

CALIFORNIA: SANTA BARBARA COUNTY—Santa Barbara, July, 1875, *Rothrock* 62 (F, G TYPE, M photograph, Par fragment, US); Santa Barbara, 1929, *Hoffmann* (CAS); SANTA CRUZ ISLAND—June 6, 1918, *Miller* (CAS); Summer, 1919, *Swain* (CAS); about Prisoner's Cove, April 14, 1927, *M. B. Peirson* (Pe); canyon at Lady's Harbor, April 10, 1930, *Muns & Norris* 11847 (Pom); near Pelican Bay, April 26, 1930, *Abrams & Wiggins* 66 (CAS); stream bed above Cochies Prietas, July 1, 1930, *Hoffmann* (Pom); Canada del Puerta Zuela, April 10, 1931, *Howell* 6220 (CAS); $\frac{1}{2}$ mile northeast of Main Ranch, April 12, 1931, *Hoffmann* (M, US isotypes of *C. insularis*); Cochies Canyon, April 12, 1931, *Howell* 6300 (CAS, Pe); SANTA ROSA ISLAND—Elder Creek, *Hoffmann* (CAS); dry slope of Water Canyon, April 8, 1930, *Muns & Crow* 11679 (Pom).

The identity of *C. Wheeleri* has long been uncertain. The type, collected on the mainland of Santa Barbara County, is so scanty as likely to cause a botanist to consider its characters as aberrant rather than genetic. More ample collections from the Santa Barbara Islands revealed the distinctness of the island material and led to the publication of *C. insularis*. The present writer has been unable, after making careful comparison of the type of *Wheeleri* with the insular material, to separate them so much as varietally.

Chorizanthe Wheeleri furnishes another example of a flowering plant which is nearly extinct on the mainland, but is still plentiful on the neighboring islands.

Besides the macroscopic characters which make the species recognizable, there are two technical characters which can aid in identifying fragmentary material. One of these, mentioned in the description, are the short, thick hairs on the involucres. These hairs, which are crystal-clear, curved, and blunt, have never been observed elsewhere in the genus. The other character is found in the cells of the perianth lobes. These cells form a roughened surface which appears minutely scaly.

25. *Chorizanthe fimbriata* Nutt. Jour. Acad. Phila. N. S. 1: 168. 1848; Benth. in DC. Prodr. 14: 25. 1857; Torrey, Pacif. R. R. Rept. [Desc. of plants collected by W. P. Blake at mouth of Gila] 5: 364, pl. 8. 1857; Torr. & Gray, Proc. Am. Acad. 8: 195. 1870; Wats. U. S. Geol. Surv. Fortieth Parallel [Bot. King's Exp.] 5: 484. 1871; Wats. Proc. Am. Acad. 12: 271. 1877; Wats. Botany [of California] 2: 36. 1880; Parry, Proc. Davenp. Acad. Sci. 4: 58. 1884; Dammer in Engl. & Prantl, Nat. Pflanzenfam. 3^{1a}: 11. 1891; Greene, Fl. Francis. 157. 1891; Hall, Univ. Calif. Publ. Bot. [Bot. Surv. San Jacinto Mountain] 1: 72. 1902; Jepson, Fl. Calif. 394. 1914; Armstrong, Field Book West. Flowers, 86. fig. on p. 87. 1915; Davidson & Moxley, Fl. So. Calif. 113. 1923; Jepson, Man. Fl. Pl. Calif. 298. 1923, excluding variety.

Erect plants, 1.5-3 or even 5 dm. tall; stem 1 to few from the base, trichotomously branched at the first node, branches spreading, pubescent; leaves petiolate, obovate-spathulate,

truncate to emarginate, tapered below the blade to petiolar wings, 3–5 cm. long, in mature specimens villous-hirsute beneath, pubescent above; bracts rarely foliaceous, acerose and spreading; inflorescence broadly cymose, the involucres in small, rather dense clusters at the ends of the branches; involucres 5–6 mm. long, the tube cylindric, about 4.5 mm. long, pubescent, sometimes densely so, teeth widely spreading, inner considerably shorter than the outer, all recurved or uncinate; flower conspicuously exserted, 5.5–7 mm. long, tube cylindric, segments ascending, about as long as the tube, all similar, the inner a little shorter, the margins fimbriate except for the linear and entire terminal lobe; stamens 9, anthers short-elliptic; styles 4 mm. long.

Type: "St. Diego, Upper California," 1836, Nuttall (Ph).

Distribution: western Riverside County and Los Angeles County, California, southward through the western half of San Diego County to Lower California.

Specimens examined:

CALIFORNIA: RIVERSIDE COUNTY—Dripping Springs, Temecula, alt. 1500 ft., June 22, 1920, Peirson 2165 (Pe); dry hills, near Murietta, May 18, 1922, Muns & Johnston 5318 (Pom); near Murietta, May 19, 1922, Peirson 3024 (Pe); LOS ANGELES COUNTY—Pasadena, May, 1882, Jones (D, Pom); SAN DIEGO COUNTY—"St. Diego," 1836, Nuttall (G fragment, M photograph, Ph TYPE); San Diego, May, 1852, Thurber 618 (G); San Diego, 1860–1861, Cooper (G); San Diego, 1868–69, Kellogg & Harford (US); San Diego, 1875, Cleveland (M); San Diego, June, 1875, Palmer 353 (M); San Diego, 1876, Cleveland (Par); San Diego, 1880, Cleveland (M); Fallbrook, March 28, 1882, Jones (Pom); Soledad, March 28, 1882, Jones (Pom); San Diego, April 19, 1882, Jones (Pom); San Diego, May, 1882, Parry (M, US); hills, San Diego, April 29, 1882, Pringle (Ph, US); San Diego Falls, June 25, 1883, Orcutt (G); Potrero, June, 1889, Orcutt (US); San Diego, June, 1891, Blaisdell 87 (CAS); Jamul Valley, July 2, 1894, Schoenfeldt 3828 (US); Del Mar, March 22, 1895, Angier 184 (M); Ocean Beach, May 16, 1897, Minnie Reed (Pom); near Pala, May 31, 1897, Parish 4399 (G, M, US); June, 1897, Redman (G); San Diego, May 25, 1902, Brandegee 1631 (CAS, G, M, Pom, RMt, US); San Diego, July 1, 1902, Herre (Pom); Mission Hills, San Diego, May 8, 1903, Abrams 3426 (M, Ph, Pom, US); San Diego, April, 1905, Brandegee (US); San Diego, 1906, K. Brandegee (M, Pom, RMt, US); Point Loma, April 21, 1913, Eastwood 2881 (CAS); Point Loma, April 21, 1913, Eastwood 2886 (CAS); Tin Juana, April 24, 1913, Eastwood 2916 (CAS); La Jolla, April 25, 1914, Clements & Clements 52 (G, M, Ph); La Jolla, May 16, 1914, Clements & Clements 50 (G, Ph); La Jolla, June 3, 1914, Clements & Clements 51 (G, M, Ph); Point Loma, June 6, 1915, Collins & Kempton 167 (US); Otay Mesa,

near San Diego, July 16, 1915, *Collins & Kempton* 2 (US); near San Diego, May 12, 1916, *Spencer* 32 (US); near Fallbrook, alt. 750 ft., May 15, 1920, *Muns & Harwood* 3852 (Pom, RMt, US); north of Pala, alt. 750 ft., June 21, 1924, *Peterson* 4763 (Pe); near Bonsal, June 13, 1928, *Wiggins* 3043 (D); near Rincon, Palomar Mts., June 14, 1928, *Wiggins* 3108 (D); San Onofre Canyon, alt. 550 ft., May 16, 1929, *C. L. Hitchcock* (Pom); near San Diego, June 4, 1931, *Howell* 6634 (CAS, M); near Dulzura, May 15, 1932, *Muns & Johnston* 18618 (E, M).

LOWER CALIFORNIA: April 13, 1883, *Orcutt* (US); San Telmo, April 16, 1886, *Orcutt* (US); Vallecito, May 22, 1886, *Orcutt* (M); near Tecate, alt. 600 m., May 30, 1932, *Fosberg* 8279 (E).

Considerable variation occurs in the height of these plants and in the shape and size of the leaves. The fimbriate perianths mark this and the next species conspicuously, however.

The specimen of Orcutt (hb. Gray) from San Diego Falls, has very large leaves, and is atypical. Another specimen of Orcutt (hb. U. S. National) from Potrero is in the range of *C. laciniata*. Specimens bearing this same data (hb. Missouri Botanical Garden) are referable to the latter species.

26. *Chorizanthe laciniata* Torr. Pacif. R. R. Rept. 7: 19. 1856; Torr. & Gray, Proc. Am. Acad. 8: 194. 1870; Wats. U. S. Geol. Surv. Fortieth Parallel [Bot. King's Exp.] 5: 484. 1871; Wats. Proc. Am. Acad. 12: 271. 1877; Wats. Botany [of California] 2: 37. 1880; Parry, Proc. Davenp. Acad. Sci. 4: 58. 1884.

Chorizanthe fimbriata Nutt. var. *laciniata* (Torr.) Jepson, Fl. Calif. 394. 1914; Davidson & Moxley, Fl. So. Calif. 113. 1923; Jepson, Man. Fl. Pl. Calif. 298. 1923.

Erect plants, 1-2 dm. tall; stem 1 to few from the base, spreading, branched above, pubescent; leaves petiolate, partly winged, broadly spatulate, emarginate, about 2 cm. long, lanate to sparsely pubescent; involucres 4 mm. long, tube subcylindric, about the same length, usually canescent, teeth very widely spreading, spines down-curved to uncinate, the inner 3 considerably shorter; flower conspicuously exserted, 7-9 mm. long, tube cylindric, perianth segments finely fimbriate, the terminal lobe very narrow; stamens 9, anthers short-elliptic; styles long.

Type: San Felipe, Imperial County, California, May, 1855, *Antisell.*

Distribution: western Riverside County, California, southward but inland to Lower California.

Specimens examined:

CALIFORNIA: RIVERSIDE COUNTY—Coahuila, San Jacinto Mts., June, 1882, *Parish Bros. 833* (Par); Aguanga, June, 1882, *Parish Bros. 1612* (M); Coahuila, San Jacinto Mts., June, 1882, *Parish Bros. 1612* (D); Aguanga, June, 1883, *Parish Bros. 1617* (US); SAN DIEGO COUNTY—San Diego, 1870, *Palmer* (Par); San Diego, 1876, *Palmer* (Par); Smith's Mt., June, 1880, *Vasey 535* (Par, US); Larkin's Station, 1880, *Vasey 543* (US); June, 1880, *Vasey 545* (Par); Potrero, July 24, 1883, *Orcutt 919* (Par); 1889, *Orcutt* (US); Potrero, June, 1889, *Orcutt* (M); Mountain Spring, May 10, 1894, *Mearns 3032* (US); Mountain Springs, May 12, 1894, *Schoenfeldt 3037* (US); summit of wagon pass, Coast Range, May 15, 1894, *Mearns 3199* (US); Jacumba Hot Springs, May 20, 1894, *Mearns 3243* (US); Jacumba Hot Springs, May 31, 1894, *Schoenfeldt 3359* (US); Cameron's Ranch, Laguna, June 22, 1894, *Schoenfeldt 3710* (US); Potrero, July, 1895, *Stokes* (D); Stonewall mine, Cuyamaca Mts., alt. 4600 ft., June 5-7, 1897, *Parish* (D); Oak Grove, July 13, 1900, *Jones* (Pom); dry sand hills, Jacumba, May 31, 1903, *Abrams 3661* (D, M, Pom); Viejas, June 16, 1906, *K. Brandegee* (D, US); Descanso, June, 1910, *K. Brandegee* (US); Warner's Springs, 1911, *Coombs* (CAS); Hot Spring Mountain, Warner's Hot Springs, 1913, *Buttle* (CAS); San Ysabel, July 29, 1915, *Collins & Kempton 253* (US); Julian, July 29-30, 1915, *A. S. Hitchcock* (US); Viejas, June 16, 1916, *K. Brandegee* (Pom); Live Oak Springs, Laguna Mts., August 6, 1916, *McGregor 62* (D); Jacumba, June 10, 1917, *McGregor 1015* (D); Cuyamaca, June 25, 1919, *Eastwood 9162* (CAS); between Jacumba and Mountain Springs, April 24, 1920, *Eastwood* (CAS); Alpine, June 27, 1923, *Muns & Harwood 7145* (Pom, RMT); dry slope, Jacumba, May 10, 1924, *Muns 8060* (Pom); Vallecito Cañon, Laguna Mts., June 26, 1924, *Peirson 4881* (Pe); sandy wash, near Jacumba, alt. 4000 ft., May 15, 1925, *Muns 9624* (Pom); San Felipe Valley, alt. 3000 ft., May 17, 1925, *Keck & McCully 67* (Pom); Henshaw Dam, alt. 3800 ft., May 26, 1926, *Jaeger* (Pom); between Jacumba and Mountain Springs, April 18, 1928, *Ferris 7049* (D); San Felipe Creek, near Sentenac Canyon, April 20, 1928, *Peirson 7847* (Pe); between El Centro and Jacumba, June 10, 1928, *Johnson* (CAS); San Felipe Ranch, alt. 2500 ft., May 6, 1929, *Muns & Hitchcock 11366* (Pom); near Warner Hot Springs, alt. 950 m., June 5, 1932, *Fosberg 8277* (E); IMPERIAL COUNTY—San Felipe, 1855, *Antisell* (Par isotype fragment); San Felipe, April, 1899, *K. Brandegee* (D); San Felipe Hill, alt. 2400 ft., April 19, 1906, *Jones* (Pom).

LOWER CALIFORNIA: near U. S. Boundary Mts., July 12, 1884, *Orcutt 919* (M, US).

Not only does *C. laciniata* have a geographic distribution which lies immediately to the east of the range of *C. fimbriata*, but also it is separable from the latter on several morphologic characters. The smaller leaves, the smaller average size of the plants, and more canescent involucres nearly always ac-

company *C. laciniata*, and the finely lacinate perianth segments, with the very narrow terminal lobes, form the best character.

Subsection 3. *UNIARISTATAE*, new subsection. Erect or decumbent plants. At least the lower bracts foliaceous. Involucres with the anterior tooth longer than the others. Perianth subcylindric; outer lobes entire, subentire, or rarely bilobed; inner lobes usually shorter, variously fimbriate, or only erose. Stamens attached at base of perianth tube. Species 27-32, incl.

Range: Mendocino County to Ventura County, California, chiefly in Monterey, and San Luis Obispo Counties.

In the species of this subsection where the inner perianth lobes are but erose, the long tooth of the involucre is conspicuously elongated.

27. *Chorizanthe obovata* Goodman, n. sp.³⁹

Erect plants, 1-3 dm. tall; stem one, or few from the base, usually trichotomously branched below and dichotomously above, subappressed or spreading pubescent; leaves basal or nearly so, oblanceolate, long-petiolate, blade 1-2 cm. long, densely but rather softly hirsute beneath, sparsely so above; lower bracts foliar, strigose, mucronate to awn-pointed, upper bracts subulate; inflorescence glomerate or disposed in closely aggregated flat-topped cymes; involucres urceolate, 4.5-5 mm. (or rarely more) long, grayish with an ascending pubescence

* *Chorizanthe obovata* Goodman, sp. nov. Planta erecta, 1-3 dm. alta; caulis solitarius aut paucis e base, subappressus vel diffuse pubescentibus, plerumque infra trichotome ramosis et supra dichotome ramosis; foliis basaliibus vel subbasaliibus, oblanceolatis, longe-petiolatis, laminis 1-2 cm. longis, subter dense et molliuscule hirsutis, supra sparse hirsutis; bracteis inferioribus foliaceis, strigosis, mucronatis vel aristatis, bracteis superioribus subulatis; inflorescentia conferta aut in cymis planis aggregatis; involucris urceolatis, 4.5-5 (raro plus) mm. longis, cinereo-adscendente-pubescentibus aut raro hirsutulis, tubo 3-4 mm. longo, dentibus divergentibus, 5 uncinatis, dente anteriore conspicue longiore (2 mm.) et recto aut recurvato; floribus subsessilibus, paulo exsertis, 4-4.5 mm. longis, glabris, lobis exterioribus tubo parum brevioribus, obovatis, ad basem attenuatis, truncatis, lobis interioribus longitudini $\frac{1}{2}$ tubi adaequantibus, breve oblongis, ad latera et summum minute fimbriatis; staminibus 9, antheris linearibus, plus 1 mm. longis.—Price Cañon, near the coast of San Luis Obispo County, California, 1911, K. Brandegee 84 (M TYPE).

or rarely but slightly hairy, tube 3–4 mm. long, teeth divergent, the 3 inner and 2 of the slightly longer outer ones uncinate, the anterior one noticeably longer (2 mm.) and straight or down-curved; flowers nearly sessile, slightly exserted, 4–4.5 mm. long, glabrous, tube slightly longer than the outer lobes, outer lobes obovate, narrowed at the base, truncate, inner lobes two-thirds as long as the tube, shortly oblong, finely fimbriate at sides and top; stamens 9, anthers linear and over 1 mm. long.

Type: Price Cañon, near the coast of San Luis Obispo County, California, 1911, *K. Brandegee* 84 (M).

Distribution: San Benito and Monterey Counties, southward into Santa Barbara County, California.

Specimens examined:

CALIFORNIA: SAN BENITO COUNTY—Hernandez, June 7, 1903, *Lathrop* (D); MONTEREY COUNTY—Priest Valley, alt. 2373 ft., August 15, 1929, *Rountree* (E); SAN LUIS OBISPO COUNTY—San Luis Obispo, July, 1885, *Brandegee* (CAS); Santa Margarita, June, 1889, *Parry* (Par); Price Cañon, near the coast, 1911, *K. Brandegee* 84 (D, G, M TYPE, Pom, RMt, US); on road between Arroyo Grande and Huasna, July 30, 1927, *Eastwood* 14981 (CAS); on new road to Pozo, May 17, 1928, *Eastwood* (CAS); along Chorro Creek, among rocks, May 17, 1928, *Eastwood* 15121 (CAS); on old road to Pozo, May 17, 1928, *Eastwood* 15137 (CAS); SANTA BARBARA COUNTY—near Mono Flat Ranger Station, alt. 1500 ft., July 3, 1923, *A. L. Grant* 1655 (M); sandy field, 7 miles west of Buellton, May 30, 1929, *Hoffmann* (E); rocky slope above ocean, 3 miles south of Point Sal, May 31, 1931, *Hoffmann* 371 (CAS).

Representatives of this species have for the most part been referred heretofore to *C. Palmeri*. The shapes of the perianth lobes differentiate the species with certainty.

27a. *Chorizanthe obovata* Goodman forma *prostrata* Goodman, n. form.⁴⁰

Plants prostrate; long tooth of the involucre straight or uncinate. Otherwise like the species.

Type: hills near San Luis Obispo, California, June, 1878, *Lemmon* (M).

Distribution: San Luis Obispo and Santa Barbara Counties, California.

"*Chorizanthe obovata* Goodman forma *prostrata* Goodman, forma nov. Planta prostrata, involueri longo dente recto vel uncinato. Cetera speciei similis.—Hills near San Luis Obispo, California, June, 1878, *Lemmon* (M TYPE).

Specimens examined:

CALIFORNIA: SAN LUIS OBISPO COUNTY—hills near San Luis Obispo, June, 1878, Lemmon (M TYPE, Ph); SANTA BARBARA COUNTY—San Marcos Pass, August 16, 1927, Hoffmann (Pom).

28. *Chorizanthe rectispina* Goodman, n. sp.⁴¹

Chorizanthe uniaristata of auths., in part.

Spreading to decumbent plants; stems several from the base, 1–2 dm. long, gray with an appressed pubescence; leaves basal, oblanceolate or spatulate, 1.5–3 cm. long, obtuse, villous-hirsute; bracts foliaceous, similar to the leaves in outline, 0.5–1 cm. long, tipped with a conspicuous awn; inflorescence of compound uniparous cymes; involucres, urceolate-cylindric, gray-pubescent, 6-ribbed, the tube 2–2.5 mm. long, 5 of the teeth short and uncinate, widely spreading, the anterior one as long as or much longer than the tube, straight and divergent; flowers partly exserted, about 3.5 mm. long, appressed-pubescent on the outer surface along the six veins, the segments very unequal, the outer 3 nearly as long as the perianth tube, broadly obovate to suborbicular and truncate, subentire, the inner 3 half as long, oblong, erose to finely fimbriate, mostly obtuse; stamens 9, anthers linear-oblong, a little over 0.5 mm. long; achene 2.5 mm. long.

Type: McGinness, 25 miles northeast of San Luis Obispo, California, July 10, 1876, Palmer 466 (M).

Distribution: San Luis Obispo and Santa Barbara Counties, California.

⁴¹ *Chorizanthe rectispina* Goodman, sp. nov. Planta diffusa vel decumbens; caulis pluribus e base, 1–2 dm. longis, cinereo-appresso-pubescentibus; foliis basalibus oblanceolatis vel spatulatis, 1.5–3 cm. longis, obtusis, villosi-hirsutis; bracteis foliaceis, circumscriptione foliis similibus, 0.5–1 cm. longis, ad apicem conspicue aristatis; inflorescentia in cymis compositis uniparitis; involucris urceolato-cylindricis, cinereo-pubescentibus, 6-costatis, tubo 2–2.5 mm. longo, 5 dentibus brevibus uncinatique, late divergentibus, anteriore dente tubi longitudinem adaequante vel superante, recto et divergente; floribus paulo exsertis, circiter 3.5 mm. longis, exteriore appresso-pubescentibus, lacinias inaequalissimis, exterioribus 3 tubo perigonii subadaequantibus, late obovatis vel suborbiculatis et truncatis, subintegris, bis longioribus quam 3 interioribus, interioribus oblongis, erosis vel fimbriatis, plerumque obtusis; staminibus 9, antheris lineari-oblongis, plus 0.5 mm. longis; achaenio 2.5 mm. longo.—McGinness, 25 miles northeast of San Luis Obispo, California, July 10, 1876, Palmer 466 (M TYPE).

Specimens examined:

CALIFORNIA: SAN LUIS OBISPO COUNTY—McGinness, 25 miles northeast of San Luis Obispo, July 10, 1876, *Palmer* 466 (CAS, M TYPE, Par, Ph, US); SANTA BARBARA COUNTY—Blochman's Ranch, June 15, 1906, *Eastwood* 452 (CAS); sandy flat, San Marcos Pass, Santa Ynez Mts., May 31, 1929, *Hoffmann* (E).

The inflorescences in this species superficially resemble cylindric racemes. This appearance is attained through the relatively slight elongation (commonly less than 5 mm.) of the longer branches of the uniparous cymes.

The long, straight tooth of the involucre caused this species to be confused with *C. uniaristata*, the error having been initiated by Dr. Watson. However, the new species is abundantly distinct. The partially exserted perianths of *C. rectispina* enable one to distinguish it from *C. uniaristata*, even with the unaided eye. With a hand lens the broadly obovate outer lobes of the perianth are readily seen.

The presence of 3 stamens in *C. uniaristata* seems to be a constant character for that species, whereas 9 stamens, with large anthers, have always been found in *C. rectispina*. The nearest relative of *C. rectispina* is *C. obovata*.

29. *Chorizanthe biloba* Goodman, n. sp.⁴²

Chorizanthe Palmeri Wats. acc. to Parry, Proc. Davenp. Acad. Sci. 4: 57. 1884, at least as to part of description and specimens from Monterey County.

* *Chorizanthe biloba* Goodman, sp. nov. Planta erecta, 1.5–3.5 dm. alta; caulis solitarius vel paucibus e base, supra dichotome aut trichotome ramosis, saepe verticillium medium bractearum foliacearum ferentibus, appresse crispo-pubescentibus et plerumque ad inflorescentiam pilis longis et divergentibus; foliis basaliis ellipticis et sessilibus vel oblanceolatis et petiolatis, 1–5 cm. longis, appresse-pubescentibus, supra minus dense pubescentibus; bracteis inferioribus foliaceis, foliis similibus sed aristatis, bracteis superioribus minoribus, 8 mm. longis, in aristam longam rectam terminatis; inflorescentia in glomerulis crebris cymosis; involucris subcylindricis, 5–7 mm. longis, cinereo-pubescentibus et ad costas grosse hirsutis, tubo 4–4.5 mm. longo, dentibus brevibus, diffusis, uncinatis, dente anteriore longiore quam ceteris; floribus parte exsertis, 5–6 mm. longis, glabris aut sparse pubescentibus, lobis 2 mm. longis, exterioribus obovatis ad basem attenuatis, obcordatis vel bilobatis, interioribus oblongis, obtusis, superiore $\frac{1}{2}$ parte fimbriato; staminibus 9, antheris linearis-oblongis, 2 mm. longis.—Paso Robles, San Luis Obispo County, California, in the coast ranges, 1911, K. Brandegree (M TYPE).

Erect plants, 1.5–3.5 dm. tall; stem one or few from the base, dichotomously or trichotomously branched above, frequently bearing a medial whorl of foliar bracts, appressed curly-pubescent and commonly with some long spreading hairs intermixed toward the inflorescence; leaves basal, elliptic and sessile to oblanceolate and petiolate, 1–5 cm. long, appressed-pubescent, less densely so above; bracts at the lower branches foliaceous, similar to the leaves but awn-pointed, upper bracts much reduced, 8 mm. long, tipped with a long, straight awn; inflorescence of close cymose clusters, involucres subcylindric, 5–7 mm. long, gray-pubescent and with coarser, spreading hairs on the ribs, tube 4–4.5 mm. long, teeth short, spreading, uncinate, anterior tooth longer than the others; flowers partly exserted, 5–6 mm. long, glabrous or slightly pubescent on the outer surface on the midveins, lobes 2 mm. long, outer obovate, narrowed at base, obcordate to bilobed, inner oblong, obtuse, upper third fimbriate; stamens 9, anthers linear-oblong, 2 mm. long.

Type: Paso Robles, San Luis Obispo County, California, in the coast ranges, 1911, K. Brandegee (M).

Distribution: San Benito and Monterey Counties, southward into Santa Barbara County, California.

Specimens examined:

CALIFORNIA: SAN BENITO COUNTY—near Hernandez, August 17, 1933, Howell 11551 (CAS); MONTEREY COUNTY—Abbott (CAS); Jolon, July, 1880, Vasey 534 (US); Reliz Cañon, near Santa Lucia Peak, July, 1891, Norton (D); Jolon, July 19, 1910, K. Brandegee (D, US); Jolon, July 5, 1929, Rountree (Pom); SAN LUIS OBISPO COUNTY—Paso Robles, Parry (Par); in the coast ranges, Paso Robles, 1911, K. Brandegee (D, M TYPE, Pom, RMt, US); Paso Robles, June 18, 1914, C. P. Smith 2849 (CAS, D); Paso Robles, May 4, 1926, Eastwood 13812 (CAS); flats near Paso Robles, June, 1927, C. Dudley (CAS); Creston, alt. 1000 ft., June 29, 1927, Feudge 1644 (Pom); SANTA BARBARA COUNTY—Santa Inez Mts., May 21, 1891, Dunn (US); gravelly slope, Figueroa Mt., San Rafael Range, May 30, 1929, Hoffmann (E).

For many years Pacific Coast botanists have realized, as indicated by notes and question marks on herbarium sheets, that the members of this species could not satisfactorily be referred to any known species. Parry,⁴³ under *C. Palmeri*, describes this species in large part, and certainly as to the perianth. Mate-

⁴³ Parry, Proc. Davenp. Acad. Sci. 4: 57. 1884.

rial of *C. biloba*, as well as of *C. obovata*, have heretofore been referred chiefly to *C. Palmeri*.

30. *Chorizanthe Palmeri* Wats. Proc. Am. Acad. 12: 271. 1877; Wats. Botany [of California] 2: 36. 1880; Parry, Proc. Davenp. Acad. Sci. 4: 57. 1884, in part; Dammer in Engl. & Prantl, Nat. Pflanzenfam. 3^{1a}: 11. 1891; Greene, Fl. Francis. 155. 1891; Jepson, Fl. Calif. 394. 1914, in part; Jepson, Man. Fl. Pl. Calif. 298. 1923, in part.

Erect plants, 1–2 dm. tall, the appressed-pubescent stems solitary, branching near or above the middle; leaves arranged along the lower portion of the stem, spatulate to oblanceolate, on slender petioles, blades 2–3 cm. long, weakly strigose below, more sparsely so above; caudine bracts verticillate and foliar, oblanceolate, bracts subtending the inflorescence smaller and awn-tipped, or subulate; inflorescence of dense cymose clusters; involucres subcylindric, about 4.5 mm. over all, tube commonly slightly gibbose at base of rib leading to the large anterior tooth, 3–4 mm. long, grayish-pubescent, teeth slightly divergent and uncinate, very short except the anterior one, this noticeably longer and sometimes scarcely uncinate; flower 3.5–5 mm. long, glabrous, outer lobes nearly 1 mm. long, orbicular, inner lobes a little shorter, shortly obovate, retuse to emarginate and finely fimbriate across the top; stamens 9, anthers versatile, oblong-linear, remarkably long (1.5 mm.).

Type: San Luis Obispo, California, June 26, 1876, *Palmer* 464 (G).

Distribution: San Luis Obispo County, California.

Specimens examined:

CALIFORNIA: SAN LUIS OBISPO COUNTY—San Luis Obispo, June 26, 1876, *Palmer* 464 (M, Par, Ph, isotypes); San Luis Mt., May–July, *Summers* (M, Pom, RMt, US); Five Mile House, near San Luis Obispo, *K. Brandegee* (D, Pom); stony, dry, open hills, June, 1884, *Summers* (US); San Luis Obispo, 1885, *Summers* (US); from Atascadero to Beach, July 24, 1920, *Abrams* 7655 (D); Polytechnic School grounds, San Luis Obispo, July 21, 1925, *McDonald* (CAS); Walter's Ranch, San Luis Obispo, August 31, 1925, *Sampson* (D); on serpentine near San Luis Obispo, July 31, 1927, *Eastwood* 15015 (CAS).

A confusion has occurred in regard to Vasey's 534a in the United States National Herbarium. The label reads, "Jolon, Monterey Co., California, 1880. Outer lobes of corolla deeply

bifid." The specimen originally referred to was doubtlessly *C. biloba*, which species includes Jolon in its range. The specimen on the sheet, however, is typical *Palmeri*.

31. *Chorizanthe Clevelandii* Parry, Proc. Davenp. Acad. Sci. 4: 62. 1884; Greene, Fl. Francis. 156. 1891; Greene, Man. Bot. Reg. San Francis. Bay, 49. 1894; Jepson, Fl. West. Mid. Calif. 151. 1901, and ed. 2. 130. 1911; Jepson, Fl. Calif. 395. 1914; Jepson, Man. Fl. Pl. Calif. 298. 1923.

More or less decumbent plants; stems several from the base, spreading pubescent; leaves basal, petioled, oblanceolate, 1-3 cm. long, obtuse, gray-pubescent; foliaceous bracts lanceolate to oblanceolate, conspicuously awned; bracts subtending the involucres acerose; inflorescence of compound uniparous cymes, the small clusters of involucres occurring at short intervals; involucres covered with spreading pubescence, the tube urceolate, triangular in cross-section, 3-3.5 mm. long, all of the 6 teeth uncinate, the anterior one considerably longer than any of the others and frequently exceeding the length of the tube; flower on a very short pedicel, included, 3.5 mm. long, the upper portion of the veins very sparingly appressed-pubescent, the outer perianth lobes a little less than 1 mm. long, ovate, minutely erose, commonly emarginate, inner lobes a little less than half as long, broadly ovate, conspicuously erose; stamens 3, opposite the inner lobes, anthers elliptic.

Type: Allen Springs, Lake Co., California, June, 1882, *Cleveland* (Par).

Distribution: an intermittent distribution as judged from present collections, and known from the following counties in California: Mendocino, Lake, San Benito, Monterey, Tulare, and Ventura.

Specimens examined:

CALIFORNIA: MENDOCINO COUNTY—Ukiah, August, 1882, *Pringle* (Par); LAKE COUNTY—Allen Springs, June, 1882, *Cleveland* (M, Par TYPE); June, 1886, *K. Brandegee* (Ph, Pom); Allen Springs, June, 1888, *Simonds* (M); Rice Fork of Eel River, July 5, 1928, *M. S. Baker* 3097b (CAS); Bogg's Lake, Mt. Hannah, alt. 3000 ft., July 14, 1929, *Blankinship* (M); near Mirabel Mine, July 9, 1931, *M. S. Baker* 5360 (CAS); between Cobb Mt. and Adams Spring, June 25, 1933, *Jussel* 143 (CAS); Coleman Place, Cobb Mt., June 27, 1933, *Jussel* 276 (CAS); SAN BENITO COUNTY—near Dominicks, San Benito River, June 3, 1899, *Dudley*

(D); near Hernandez, August 17, 1933, Howell 11552 (CAS); MONTEREY COUNTY—Tassajara Hot Springs, June, 1901, Elmer 3245 (D, M, Pom, US); TULARE COUNTY—vicinity of Second Dry Meadow Creek, Kern River, July 15, 1895, Dudley 733 (D); VENTURA COUNTY—below Mission Pines, San Rafael Mts., alt. 4500 ft., July 26, 1930, Hoffmann (CAS, Pom).

32. Chorizanthe uniaristata Torr. & Gray, Proc. Am. Acad. **8**: 195. 1870; Wats. U. S. Geol. Surv. Fortieth Parallel [Bot. King's Exp.] **5**: 484. 1871; Wats. Proc. Am. Acad. **12**: 272. 1877, in part; Wats. Botany [of California] **2**: 38. 1880, in part; Parry, Proc. Davenp. Acad. Sci. **4**: 61. 1884, in part; Greene, Fl. Francis. 156. 1891, in small part; Jepson, Fl. West. Mid. Calif. 151. 1901, in part, and ed. 2. 130. 1911, in part; Jepson, Fl. Calif. 395. 1914, in part; Jepson, Man. Fl. Pl. Calif. 298. 1923, in part.

Decumbent plants; stems usually several from the base, 1 dm. or more long, spreading pubescent; leaves basal and petiolate, oblanceolate, 2–3 cm. long, long-pubescent; bracts narrowly linear and acerose; inflorescence of uniparous cymes, or sometimes of nearly equally branched cymes, the involucres occurring in small clusters; involucres cylindric, urceolate, pubescent with ascending hairs, tube 2–2.75 mm. long, 5 of the teeth widely spreading, recurved or uncinate, the anterior one divergent, straight, and equaling or twice the length of the tube; flower slender, included or but inconspicuously exserted, about 2.75 mm. long, sparsely pubescent on the veins, outer lobes linear-oblong to linear-oblanceolate, rounded and minutely erose at apex, 1 mm. long, inner scarcely half so long, and half as wide, linear, obtuse, slightly erose; stamens 3, opposite the inner lobes, anthers suborbicular.

Type: dry places, New Idria, California, Brewer (G).

Distribution: San Benito, Fresno, Monterey, and Kern Counties, California.

Specimens examined:

CALIFORNIA: SAN BENITO COUNTY—mountains near New Idria, July, 1861, Brewer 2739 (US part of TYPE collection); FRESNO COUNTY—dry, sandy loam, near Kingsburg, June 27, 1901, Kearney 72 (M, US); MONTEREY COUNTY—near Mt. Diablo, 1884, Curran (D); Palisades, June, 1891, Norton (CAS); near Gonzales, July, 1891, Norton (CAS, D); foot of Jolon grade, June 7, 1909, K. Brandegee (US); Jolon, June 8, 1909, K. Brandegee (D); on stony hilltops, Jolon, June,

1915, Hall 10033 (US); KERN COUNTY—Walker Basin, alt. 1000 m., June 24, 1901, Coville & Funston 1090 (D, US); plains east of Bakersfield on Tehachapi Road, June 12, 1921, Ferris & Duncan 2205 (CAS, D); between Caliente and Bodfish, near Walker Basin, July 9, 1933, Peterson 10684 (M, Pe).

That *C. Clevelandii* and *C. uniaristata* are closely related there can be no doubt, although there are several morphological differences between them as delineated in the descriptions. The two species can be readily separated by the character of the long tooth of the involucre. In *C. Clevelandii* this spine is uncinate, in *C. uniaristata*, straight.

Subsection 4. PARRYANAE, new subsection. Spreading, gray-pubescent plants with basal leaves and foliaceous bracts. Involucral tubes short (about 2 mm. long), the teeth widely spreading. Perianth partially exserted, slightly pubescent, outer surface white; tube cylindric; outer lobes longer than the inner. Stamens 9, inserted at the base of the perianth. Species 33-34.

Range: Los Angeles and western Riverside Counties south into northern Lower California.

33. *Chorizanthe Parryi* Wats. Proc. Am. Acad. 12: 271. 1877; Wats. Botany [of California] 2: 37. 1880; Parry, Proc. Davenp. Acad. Sci. 4: 61. 1884; Dammer in Engl. & Prantl, Nat. Pflanzenfam. 3^{1a}: 12, fig. 5 N. 1891; Abrams, Fl. Los Angeles & Vicinity, 114. 1904, and ed. 2. 105. 1917; Jepson, Fl. Calif. 395. 1914, excluding synonymy; Davidson & Moxley, Fl. So. Calif. 113. 1923; Jepson, Man. Fl. Pl. Calif. 298. 1923.

Diffuse or decumbent plants, a few cm. to as much as 3 dm. high; stems several from the base, ascending pubescent to canescent; leaves oblanceolate, frequently narrowly so, and tapered to a petiole, commonly mucronate, 2-7 cm. long, scarcely pubescent to canescent beneath, glabrate to sparsely pubescent above; lower bracts similar to the leaves, the upper ones acerose; inflorescence chiefly a loose cyme, the involucres aggregated at the ends of the branches into small clusters; involucres 6-ribbed, urceolate, about 3 mm. long, appressed-pubescent, tube triangular in cross-section, 2 mm. long, the larger teeth squarrose, as long as the tube, shortly recurved or unci-

nate, inner teeth very short, uncinate; flower 2.5–3.25 mm. long, segments widely spreading, outer oblong-obovate to oblong, obtuse, commonly erose, about 1.25 mm. long, inner linear-lanceolate, subacute, entire, 0.5 mm. shorter; anthers oblong, achene 2.25 mm. long.

Type: gravelly mesas near Crofton, San Bernardino County, California, coll. of 1876, *Parry* (G).

Distribution: western San Bernardino and Riverside Counties, Los Angeles County and southward into San Diego County, California.

Specimens examined:

CALIFORNIA: SAN BERNARDINO COUNTY—1876, *Parry* & *Lemmon* 370 (M, Par); San Bernardino, 1880, *Parish* (M); San Bernardino, May, 1880, *Vasey* 540 (US); San Bernardino, 1881, *Parry* 269 (M, Par, US); San Bernardino, May, 1881, *Parish Bros.* 827 (D, ISC, Ph, US); Colton, April 27, 1882, *Jones* 3181 (CAS, D, M, Pom, US); sandy plains, Colton, May 29, 1882, *Pringle* (Ph, US); sandy plains, May, 1888, *Parish* (M); Rialto, May 29, 1889, *Parish* (M); Arrowhead Springs, May 11, 1891, *Fritchey* 44 (M); Yucaipa, San Bernardino Mts., alt. 2500 ft., June 13, 1894, *Parish* 3218 (US); vicinity of San Bernardino, April 10, 1900, *Parish* (D); Yucaipa, alt. 2500 ft., May, 1900, *Parish* (Pom); vicinity of San Bernardino, April 27, 1901, *Parish* 4703 (D); Redlands, May, 1906, *Greats* 455 (CAS); Arrowhead Hot Springs, May 22, 1906, *Grant* (Pom); Arrowhead Hot Springs, May 22, 1906, *Grant* 6627 (D); Arrowhead Hot Springs, alt. 1750 ft., May 21–28, 1906, *Grant* 6642 (D); East Highlands, April 16, 1915, *Cox* (Pom); dry mesas, San Bernardino Valley, alt. 300 m., May 17, 1917, *Parish* 11219 (Pom); sandy wash, Lytle Creek, San Bernardino Valley, July 8, 1917, *Johnston* (Pom); sandy wash, Highland, alt. 1000 ft., May 7, 1919, *Spencer* 1183 (CAS, Pom); Arrowhead Hot Springs, alt. 1000 ft., May 9, 1919, *Spencer* 1103 (CAS, Pom); between Claremont and Upland, June 2, 1921, *Robinson* 71 (Pom, RMt); near Arrowhead Hot Springs, alt. 1350 ft., April 28, 1923, *Feudge* 240 (Pom); sandy soil, east of Upland, alt. about 1000 ft., June 11, 1927, *Howell* 2482 (CAS); RIVERSIDE COUNTY—San Gorgonio, *Parry* (M, Par); Elsinore, May, 1901, *Mrs. J. D. Abrams* (D); Banning, alt. 2300 ft., May 11, 1903, *Jones* (CAS, D, Pom); Palm Springs, March 25, 1920, *Jaeger* 1058 (Pom); near Murietta, alt. 1500 ft., May 19, 1922, *Munz* & *Johnston* 5359 (Pom); near Murietta, May 19, 1922, *Pearson* 3055 (Pe); San Gorgonio Pass at Cabazon, June 5, 1931, *Howell* 6658 (CAS, M); LOS ANGELES COUNTY—Claremont, June 10, 1900, *Shaw* (Pom); Glendora, May 14, 1902, *Grant* (D); Mt. Lowe, alt. 4000 ft., June, 1902, *Grant* 171 (D); Claremont, April, 1912, *Howery* (M); Claremont, June 15, 1912, *de Camp* (M); dry wash in chaparral, Claremont, May 13, 1919, *Munz* 2790a (Pom); San Gabriel Wash, San Gabriel Mts., alt. 600 ft., May 12, 1920, *Pearson* 2131 (Pe); mountains near Claremont, May 21, 1926, *Jones* (D, Pom); Claremont, June 15, 1928, *Eastwood* 15383 (CAS); San Gabriel Wash, alt. 350 ft., May 26, 1932, *Wheeler* 744 (M); Thompson Creek Dam near Claremont, alt. 1600 ft., May 27,

1932, *Wheeler* 765 (M); SAN DIEGO COUNTY—Soledad, March 28, 1882, *Jones* (Pom); COUNTY NOT KNOWN—alt. 500 m., April 13, 1898, *Leiberg* 3300 (US).

33a. *Chorizanthe Parryi* Wats. var. *fernandina* (Wats.) Jepson. Man. Fl. Pl. Calif. 298. 1923.

Chorizanthe fernandina Wats. Botany [of California] 2: 481. 1880; Parry, Proc. Davenp. Acad. Sci. 4: 61. 1884; Abrams, Fl. Los Angeles & Vicinity, 114. 1904, and ed. 2. 105. 1917; Jepson, Fl. Calif. 395. 1914, in synonymy; Davidson & Moxley, Fl. So. Calif. 113. 1923.

Involucral teeth straight or merely curved, divergent, sometimes widely so, outer commonly longer than the tube, inner very short. Otherwise as in the species.

Type: San Fernando Cañon, Los Angeles County, California, June, 1879, *Mrs. E. A. Bush* (G).

Distribution: Los Angeles and Orange Counties, California.

Specimens examined:

CALIFORNIA: LOS ANGELES COUNTY—San Fernando Valley, June, 1879, *Mrs. E. A. Bush* (CAS, US, isotypes); May, 1882, *Parry* (M, US); San Fernando, May 23, 1882, *Pringle* (M, Ph, US); Los Angeles River bed, April, 1884, *Lyon* (CAS); San Fernando Valley, June, 1887, *Parry* 1987 (Par); Newhall, June 3, 1893, *Hesse* (D); Chatsworth Park, April 4, 1901, *Abrams* 1337 (D, Pom, RMt); San Fernando Wash, May 11, 1913, *Eastwood* 3139 (CAS, US); Little Tujunga Wash, San Fernando Valley, alt. 1100 ft., May 3, 1920, *Peirson* 2120 (Pe); ORANGE COUNTY—Spring, 1902, *Geis* (D, Pom); hills near Santa Ana, Spring, 1902, *Geis* 541 (D, Pom).

The geographic distribution of the variety, it will be noted, forms not merely an aspect of the species distribution, but an isolated area of its own. This area lies a little to the west of the north end of the range of the species. All specimens examined by the writer which possessed straight teeth were from the San Fernando region, whereas all the specimens from the geographic range of *C. Parryi* possessed the strongly down-curved or uncinate teeth.

34. *Chorizanthe inequalis* Stokes, Zoe 5: 60. 1900.

Diffuse plants; stems several from the base, slender, grayish ascending pubescent; leaves linear-ob lanceolate, 2–4 cm. long, appressed-pubescent; lower bracts similar to the leaves, upper ones mostly acicular; inflorescence a loose cyme, the in-

vulcures in small clusters at the ends of the branches or solitary and sessile in the lower axils; involucres urceolate, more or less triangular in cross-section, 3.5–6 mm. long, ascending pubescent, the teeth divergent, straight, outer as much as 4 mm. or more long, inner very short; flower 2.5–3 mm. long, outer lobes less than half as long as the perianth, outer segments obovate to oblong-obovate, erose, inner linear-oblong to oblong-obovate, a little shorter, minutely erose; anthers elliptic.

Type: San Telmo, Baja California, May 31, 1893, T. S. Brandegee (UC).

Distribution: Lower California.

Specimens examined:

LOWER CALIFORNIA: Salada, April-May, 1886, Orcutt 1369 (CAS, M, Par, US); April 17, 1886, Orcutt (US); San Quentin Bay, January, 1889, Palmer 651 (Ph, US); San Telmo, May 31, 1893, Brandegee (M photograph, UC TYPE).

The morphology of the flower of this Lower Californian species is very similar to that of *C. Parryi* and its variety, but the involucres and the general aspect of the plant differentiate it sharply. The long involucral teeth give the plant a spiny appearance, and an aspect of gracefulness is attained because of the slender stems and long internodes.

Subsection 5. FLAVAE, new subsection. Erect to procumbent plants with basal leaves and usually non-foliaceous bracts. Involucres solitary and remote or in small clusters at the ends of the branches, about 5 mm. long, the awns infrequently uncinate, the inner teeth very short to obsolete. Flowers 5 mm. or more long, partially exserted. Perianth lobes similar or nearly so. Stamens 9. Species 35-37, incl.

Range: central Lower California.

The species included in this section have the most southern range of the North American representatives of the genus.

35. *Chorizanthe mutabilis* T. S. Brandegee, Proc. Cal. Acad. Sci. II. 2: 203. 1889. Pl. 1, fig. 12.

Plants erect or procumbent, 1–3 dm. long; stem solitary or few from the base, sparingly long-pubescent to glabrate, pale reddish; leaves narrowly lanceolate and long-petiolate, 1–2 cm.

over all, loosely tomentose below, long-pubescent above; bracts linear-lanceolate to acicular, hirsutulose to glabrate; inflorescence a uniparous cyme, the involucres solitary and remote, or more crowded at the ends of the branches; involucres, including the cylindric tube, 5 mm. long, ribs not reaching the base, sparingly pubescent, the larger teeth widely divergent, short and sometimes uncinate, the smaller set of teeth minute, some of the lower involucres a little longer, the larger teeth 3-4 mm. long, the awns short, straight or curved, the smaller divergent, 1 mm. long, a thin membrane appearing in the sinuses and frequently extending along the upper margins; flower cylindric, 6-7 mm. long, long-pubescent on the midveins above the middle, lobes linear-oblong, obtuse, entire or crenulate, about 2.5 mm. long, inner segments a little narrower; stamens adnate for a short distance to the perianth-tube, anthers oblong.

Type: San Enrique, Lower California, May 2, 1889, T. S. Brandegee (UC).

Distribution: near San Enrique, Lower California.

Specimens examined:

LOWER CALIFORNIA: San Enrique, May 2, 1889, Brandegee (CAS, M, Ph, Pom, US, isotypes).

This species, still so rare in herbaria, is well marked and easily recognized. Its nearest relative is *C. flava*. While it is probably unwise to designate one species as being more primitive than another in so small a subsection, nevertheless *C. mutabilis* is listed first, partly because its involucres are less modified than in *C. flava* and *C. pulchella*. These organs in the present species more nearly resemble the involucres of preceding subsections, and while the smaller trio of teeth are much reduced, they are not obsolete as they are in the other two species.

Brandegee states that the perianth tube in *C. mutabilis* is yellow and the segments white or rose color.

36. Chorizanthe flava T. S. Brandegee, Proc. Cal. Acad. Sci. II. 2: 202. 1889. Pl. 1, fig. 13.

Chorizanthe Vaseyi Parry & Rose, Bot. Gaz. 15: 64, pl. 10. 1890; Vasey & Rose, Contr. U. S. Nat. Herb. 1: 12. 1890.

Suberect or decumbent plants, a few cm. to 1.5 dm. or more high; stems several from the base, sparsely long appressed-pubescent; leaves spathulate, with a slender winged petiole, 1-5 cm. long, tomentose beneath, less densely so above, the midrib glabrate; bracts linear-lanceolate; inflorescence of elongated uniparous cymes, the involucres single and remote except at the ends of the branches; involucres subcylindric, ribs nearly lacking, 5 mm. long, tube 4 mm. long, curly-pubescent, the 3 larger teeth 3-5 mm. long, widely spreading, straight to falcate, one a little longer than the other two, inner teeth obsolete or nearly so, their positions taken instead by noticeable, hairy membranes; flower obconic, about 6 mm. long, minutely and sparsely pubescent, yellow, lobes 2 mm. long, linear-lanceolate, all similar; anthers short-oblong.

Type: Calmalli, Lower California, April 18, 1889, T. S. Brandegee (UC).

Distribution: region of Calmalli, Lower California.

Specimens examined:

LOWER CALIFORNIA: "40 miles from ocean, hilly country," Lagoon Head, March 6-15, 1889, Palmer 775 (M, Par, US TYPE material of *C. Vaseyi*); Calmalli, April 18, 1889, Brandegee (M photograph, Ph isotype); plains, Calmalli, January-March, 1898, Purpus 126 (D, US); plains, Calmalli, January-March, 1898, Purpus (D, US); margin of the Vicencino Desert, 39 miles north of San Ignacio, January 31, 1929, Reed 6193 (Pom).

Brandegee's publication preceded that of Parry & Rose by four months. Ironically, the type of *C. Vaseyi* was collected a month before Brandegee collected his *C. flava*. A good illustration of the species accompanies the Parry & Rose publication.

In the original description of *C. Vaseyi*, the type is given as *Palmer 275* rather than *Palmer 775*. This is doubtless a typographic error.

37. *Chorizanthe pulchella* T. S. Brandegee, Proc. Cal. Acad. Sci. II. 2: 203. 1889.

Plants erect to spreading; stems several from the base, becoming reddish in age, only slightly branched, sparsely ascending pubescent; leaves ovate, acute, abruptly contracted at base to a long, winged petiole, blades less than 1 cm. long; bracts

acerose, usually spreading; involucres disposed singly in loose, uniparous cymes, 5 mm. long, tube as long, cylindric, tomentose to glabrate, the 3 larger teeth widely spreading, falcate, longer than the tube, the inner erect, very short, scarcely exceeding the sinal membrane; flowers 9-12 mm. long, the tube yellow, lobes ovate-oblong in outline, deeply and numerously lacinate, reddish; anthers oval.

Type: San Sebastian, Lower California, April 28, 1889,
T. S. Brandegee (UC).

Distribution: near San Sebastian, Lower California.

Specimens examined:

LOWER CALIFORNIA: San Luis, April 27, 1889, *Brandegee* (CAS); San Sebastian, April 28, 1889, *Brandegee* (CAS, Ph, isotypes, M photograph).

The reduction in the number of involucres at the branches of the cymes from several to one, the markedly arrested development of the smaller teeth of the involucre, and the laciniate condition of the perianth lobes are characters found in this species which indicate a comparatively highly evolved condition.

Subsection 6. PROCUMBENTES, new subsection. Diffuse to decumbent plants, stems several from the base, dichotomously branched, the leaves basal, and the lower bracts usually foliaceous. Inflorescence of compound, uniparous cymes. Involucres short (tube 2 or rarely 3 mm. long), with small, yellow membranes in the sinuses. Perianth lobes similar or nearly so, entire. The 9 stamens united by their filaments into a short, pilose-ciliate staminal tube. Species 38-40, incl.

Range: Los Angeles County, California, south into Lower California.

38. **Chorizanthe procumbens** Nutt. Jour. Acad. Phila. N. S. 1: 167. 1848; Benth. in DC. Prodr. 14: 26. 1857; Gray, Proc. Bost. Soc. Nat. Hist. 7: 148. 1859, as to name only; Torr. & Gray, Proc. Am. Acad. 8: 195. 1870; Wats. U. S. Geol. Surv. Fortieth Parallel [Bot. King's Exp.] 5: 484. 1871; Wats. Proc. Am. Acad. 12: 271. 1877; Wats. Botany [of California] 2: 37. 1880; Parry, Proc. Davenp. Acad. Sci. 4: 60. 1884; Dammer in

Engl. & Prantl, Nat. Pflanzenfam. 3^{ta}: 12. 1891; Abrams, Fl. Los Angeles & Vicinity, 114. 1904, and ed. 2. 104. 1917; Jepson, Fl. Calif. 395. 1914; Davidson & Moxley, Fl. So. Calif. 113. 1923; Jepson, Man. Fl. Pl. Calif. 298. 1923.

Chorizanthe uncinata Nutt. Jour. Acad. Phila. N. S. 1: 167. 1848; Benth. in DC. Prodr. 14: 26. 1857, in synonymy; Torr. & Gray, Proc. Am. Acad. 8: 195. 1870, in synonymy.

Procumbent or diffuse plants, 3–15 cm. high; stems curly ascending pubescent; leaves spathulate-ob lanceolate to oblong, 2–7 cm. long including the slender petioles, long and densely pubescent beneath, at least when young, more sparsely pubescent to glabrate above; lower bracts frequently foliaceous and similar to the leaves, upper bracts acerose; the involucres aggregated into small clusters, short, 2–2.5 mm. long, pubescent to sparsely so, the tube cylindric, 6-ribbed, about 2 mm. long, the 6 teeth widely divergent, their tips down-curved or uncinate, the 3 larger as long as the tube, the inner a little shorter; flower partly exserted, cylindric, 1.5–2 mm. long, yellow, the lobes oblong (or the inner sometimes ovate), obtuse, a third to a half as long as the tube, the inner slightly smaller, an appressed, scanty pubescence along the midveins; stamens just included, anthers oblong, very small.

Type: "St. Diego, Upper California," coll. of 1836, *Nuttall* (Ph.).

Distribution: western San Bernardino and Riverside Counties, Los Angeles County, California, and southward to Lower California.

Specimens examined:

CALIFORNIA: SAN BERNARDINO COUNTY—Colton, 1881, *Parry* 270 (G, Par, US); Colton, May 8, 1881, *Parry* (G); mesas, San Bernardino Valley, April 29, 1888, *Parish Bros.* 826 (D, ISC, M, US); vicinity of San Bernardino, alt. 1000-1500 ft., May 20, 1895, *Parish* 3663 (G, US); east of Upland, alt. about 1000 ft., June 11, 1927, *Howell* 2481 (CAS); RIVERSIDE COUNTY—Cabazon, April, 1891, *Orcutt* (M); LOS ANGELES COUNTY—Pasadena, May 2, 1882, *Jones* (Pom); Roseco, May 27-June 10, 1906, *Eastwood* 258 (CAS, G); San Fernando Wash, May 11, 1913, *Eastwood* (CAS); dry wash in chaparral, Claremont, May 13, 1919, *Muns* 2790 (D, Pom); Arroyo Seco, San Gabriel Mts., alt. 1250 ft., May 20, 1919, *Peirson* 446 (Pe); Santa Anita Wash, San Gabriel Mts., alt. 700 ft., April 26, 1920, *Peirson* 4212 (Pe); mountains near Claremont, May 21, 1926, *Jones* (US); Thompson

Creek Dam near Claremont, alt. 1600 ft., May 27, 1932, Wheeler 766 (M); SAN DIEGO COUNTY—San Diego, 1836, Nuttall (G isotype, M photograph, Ph isotype, US photograph); San Diego, 1836, Nuttall (G fragment of TYPE of *C. uncinata*, Ph TYPE of *C. uncinata*, US photograph); San Diego, 1874, Cleveland (G); San Diego, 1875, Palmer 135 (US); San Diego, June, 1875, Palmer 564 (M); 1880, Vasey 542 (G, US); San Diego, 1882, Parry 270 (G, M, Par); Soledad, April 20, 1882, Jones 3159 (CAS, D, M, Pom, US); San Diego, May, 1882, Parry (Par); San Diego, 1884, Orcutt (Par); Point Loma, March 28, 1884, Parry (Par); mesaas, San Diego, May 8, 1884, Orcutt (M); San Diego, May 15, 1885, Orcutt (US); San Diego, April 24, 1891, Dunn (D); Coronado, May 5, 1891, Dunn (US); San Ysabel, April 28, 1893, Henshaw (US); Witch Creek, June, 1894, Alderson (D); San Diego, June, 1895, Stokes (D); Point Loma, April, 1896, K. Brandegee (D); San Diego, May, 1901, K. Brandegee (US); San Diego, May 25, 1902, Brandegee 1638 (G, M, Pom, RMt, US); Coronado, Grant 2607 (D); near Potrero, June 3, 1903, Abrams 3737 (D, G, M, Ph, Pom); San Diego, April, 1905, Brandegee (US); San Diego, May 5, 1906, Grant 6818 (D); sandy hills, Point Loma, June, 1906, K. Brandegee 29 (D, G, M, Ph, Pom, RMt, US); Point Loma, April 21, 1913, Eastwood 2874 (CAS, G, US); La Jolla, May 23, 1914, Clements & Clements 49 (G, M, Ph); Otay Mesa, near San Diego, June 14, 1915, Collins & Kempton 183 (US); sandy slopes, Granite, alt. 2000 ft., May 30, 1916, Spencer 33 (G, US); Alpine, June 27, 1923, Munz & Harwood 7146 (Pom, RMt); sandy soil, Cardiff, May 9, 1924, Munz 7958 (Pom).

LOWER CALIFORNIA: Tecate River, June 23, 1894, Schoenfeldt 3716 (US).

The yellow, triangular membrane in the sinuses between the teeth furnishes a ready means of distinguishing this species from its immediate allies. This character may be seen readily by the aid of a binocular dissecting microscope when the involucres have been pressed in such a way as to open the sinus and stretch the membrane. The yellowish-green color of all except the last member of this subsection is also characteristic.

The lower bracts of *C. procumbens* are sometimes bract-like rather than foliaceous, or are lacking in herbarium specimens. Foliaceous bracts are not mentioned in Nuttall's original description, and Watson⁴⁴ and Parry⁴⁵ state that the bracts are not foliaceous.

The inner teeth of the involucre are smaller than those of the outer 3, but there is not the disparity in size which occurs in many of the species.

Nuttall's *C. uncinata* is itself distinguishable from the type

⁴⁴ Wats. Proc. Am. Acad. 12: 271. 1877, and Botany [of California] 2: 33, 37. 1880.

⁴⁵ Parry, Proe. Davenp. Acad. Sci. 4: 60. 1884.

of *C. procumbens* in that the involucral teeth are longer and more uncinate, and the involucres are less pubescent. However, the series of specimens examined present so many intermediates between the two extremes that it seems impossible to give *uncinata* recognition.

**38a. *Chorizanthe procumbens* Nutt. var. *albiflora* Goodman,
n. var.⁴⁶**

Similar to the species but the flowers white.

Type: dry slope 2 miles east of Pala, San Diego County, California, April 30, 1926, *Munz* 10372 (Pom).

Distribution: northern San Diego County, California.

Specimens examined:

CALIFORNIA: SAN DIEGO COUNTY—Pala, June, 1880, *Vasey* 542 (US); near Fallbrook, May 15, 1920, *Munz & Harwood* 3897 (Ph, Pom); near Pala, June 21, 1922, *Munz* 8192 (Pom); southeast of Pala, alt. 800 ft., June 21, 1924, *Peirson* 4766 (Pe); dry slope, 2 miles east of Pala, April 30, 1926, *Munz* 10372 (M photograph, Pom TYPE); near Pala, April 30, 1926, *Peirson* 6692 (Pe); wash, south of Pala, April 20, 1928, *Reed* 5827 (CAS); above Rincon, Palomar Mts., June 14, 1928, *Wiggins* 3090 (D); sandy flats, east of Pala, May 11, 1930, *Howell* 4856 (CAS).

**38b. *Chorizanthe procumbens* Nutt. var. *mexicana* Goodman,
n. var.⁴⁷**

Small plants, 2 to few cm. tall, the foliaceous bracts seemingly early deciduous; involucral teeth very slender and uncinate; flowers 2 mm. long, yellowish to whitish, lobes equal, broadly ovate to broadly elliptic-oblong, about 0.75 mm. long; otherwise similar to the species.

Type: open spaces in chaparral, Tecate, Lower California, alt. 600 m., May 30, 1932, *F. R. Fosberg* 8281 (M).

Distribution: northwestern Lower California.

"*Chorizanthe procumbens* Nutt. var. *albiflora* Goodman, var. nov., similis speciei, sed floribus albis.—Dry slope, 2 miles east of Pala, San Diego County, California, April 30, 1926, *Munz* 10372 (Pom TYPE).

"*Chorizanthe procumbens* Nutt. var. *mexicana* Goodman, var. nov. Planta parva, 2 vel pauca cm. alta; involuceri dentibus tenuissimis et uncinatis; floribus 2 mm. longis, flavescentibus vel albidis, laciinis aequalibus, late ovatis vel late elliptico-oblongis, circiter 0.75 mm. longis. Cetera speciei similis.—Open spaces in chaparral, Tecate, Lower California, alt. 600 m., May 30, 1932, *F. R. Fosberg* 8281 (M TYPE).

Specimens examined:

LOWER CALIFORNIA: All Saints Bay, April, 1882, Fish (G); Tecate, alt. 600 m., May 30, 1932, Fosberg 8281 (M TYPE).

The broad lobes of this variety suggest *C. Jonesiana*, but the short branches of the inflorescence and the slender teeth of the involucres ally it more closely to *C. procumbens*.

39. *Chorizanthe Jonesiana* Goodman, n. sp.⁴⁸

Pl. 2, fig. 2.

Decumbent plants; stems several from the base, 1-2 dm. long, sparsely curly ascending pubescent; leaves petiolate, oblanceolate, 2-4.5 cm. long, sparsely pubescent; lower bracts similar to the leaves, upper lanceolate-acicular; the long branches of the uniparous cymes 2-3 cm. long, the involucres solitary or in scattered clusters, 6-ribbed, 3-4 mm. long, tube 2-3 mm. long, campanulate, sparsely spreading pubescent, the awned portion of the teeth short and uncinate, the larger set arcuate, widely divaricate, and as long as or longer than the tube; inner much smaller, the small yellow membrane in the sinuses apparent; flower partially exserted, obconic, about 3 mm. long, glabrate, white, lobes elliptic-obovate, a third as long as the tube, inner scarcely smaller; the 9 stamens united into a short, pilose-ciliate tube, anthers linear-oblong.

Type: ranch, 29 miles southwest of Tia Juana, Lower California, April 13, 1925, M. E. Jones (Pom.)

Distribution: northwestern Lower California.

Specimens examined:

LOWER CALIFORNIA: Ensenada, April 12, 1882, Jones (Pom.); April 11, 1882,

**Chorizanthe Jonesiana* Goodman, sp. nov. Planta decumbens; caulis pluribus e base, 1-2 dm. longis, sparse adscendente pubescentibus; foliis petiolatis, oblanceolatis, 2-4.5 cm. longis, sparse pubescentibus; bracteis inferioribus foliis similibus, superioribus lanceolato-acicularibus; ramis cymarum uniparitarum 2-3 em. longis; involueris solitariis vel in glomerulis laxis, 6-costatis, 3-4 mm. longis, tubo campanulato, 2-3 mm. longo, divergente pubescente, spinis dentium brevibus et uncinatis, majoribus 3 arcuatis, late divaricatis, tubum adaequantibus vel superantibus, alternatis multum parvioribus; floribus paulo exsertis, obconicis, circiter 3 mm. longis, glabratris, albis, lacinias elliptico-obovatis, 0.75 mm. longis, interioribus vix parvioribus; staminibus 9, in tubum brevem pilosum conjunctis; antheris linearis-oblongis.—Ranch, 29 miles southwest of Tia Juana, Lower California, April 13, 1925, M. E. Jones (Pom TYPE).

Jones (Pom); May 29, 1883, Orcutt 877 (G); ranch, 29 miles southwest of Tia Juana, April 13, 1925, Jones (D, M photograph, Pom TYPE).

The long internodes of the inflorescence, the thickened involucral teeth with short awns, and the white flowers serve to readily distinguish *C. Jonesiana* from its nearest relative, *C. procumbens*. The broader lobes of the perianth form a most important, though hidden, difference between the two species. In young flowers of *C. Jonesiana* the inner lobes have been observed to be orbicular-obovate.

40. *Chorizanthe chaetophora* Goodman, n. sp.⁴⁹

Pl. 2, fig. 1.

Plants spreading, only slightly branched, 1-1.5 dm. long, grayish with a loosely appressed pubescence; leaves petiolate, oblanceolate, obtuse to rounded, about 3 cm. long, shortly villos; lower bracts similar to the leaves, reduced above, the upper small and linear; involucres arranged in small clusters along a compound uniparous cyme, gray with appressed pubescence, tube campanulate, 2 mm. long, the 3 larger teeth widely spreading, areuate, 2-3 mm. long, thickened toward the base, spines cuspidate, short, nearly straight, inner short and spreading, membranes of the sinuses yellow but inconspicuous; flowers narrowly obconic, 2.5 mm. long, slightly pubescent on the outer surface, the hairs surpassing the perianth lobes, these yellow, equal, short (0.5 mm. long), oblong; filaments united into a short, ciliate tube, anthers oblong.

Type: San Quentin Bay, Lower California, January, 1889, Palmer 652 (Ph).

* *Chorizanthe chaetophora* Goodman, sp. nov. Planta diffusa, ramosiuscula, 1-1.5 dm. longa, cinerea, laxe appresso-pubescentis; foliis petiolatis, oblanceolatis, obtusis vel rotundatis, circiter 3 cm. longis, breve villosis; bracteis inferioribus foliis similibus, superioribus parvioribus, linearibus; involucris in glomerulis parvis in cyma composita uniparita dispositis, cinereo-appresso-pubescentibus, tubo campanulato, 2 mm. longo, 3 majoribus dentibus late divergentibus, areustis, 2-3 mm. longis, ad basem crassulatis, spinis dentium cuspidatis, brevibus, subrectis, inferioribus brevibus et divergentibus, sinorum membranis flavis sed inconspicuis; floribus anguste obconicis, 2.5 mm. longis, exteriore pubescentculis, pilis perigonii lacinias superantibus, flavis, lacinias aequalibus, brevibus (0.5 mm. longis), oblongis; filamentis in tubum brevem ciliatum conjunctis, antheris oblongis.—San Quentin, Lower California, January, 1889, Palmer 652 (Ph TYPE).

Distribution: near San Quentin, Lower California.

Specimens examined:

LOWER CALIFORNIA: San Quentin Bay, January, 1889, Palmer 652 (G, M photograph, Ph TYPE, US).

This species is most nearly related to *C. procumbens* var. *mexicana*, but differs chiefly in the large, thick teeth of the involucre, and in the gray pubescence of the stems and involucres. *Chorizanthe chaetophora* superficially simulates to a remarkable degree *C. inequalis* of the Parryanae subsection.

The specific appellation is in allusion to the pubescence of the perianth which, so far as present observation shows in this subsection, uniquely exceeds the perianth lobes.

DIAGNOSIS OF ERIOGONELLA, NEW GENUS

In the course of transferring to other genera several species heretofore usually considered as members of *Chorizanthe*, it was discovered that two of these species, *C. membranacea* and *C. spinosa*, could not correctly be referred to any known genus. Below, under "Species Excluded," they are properly referred to the following genus:

Eriogonella Goodman, n. gen. of the Polygonaceae.⁵⁰ Annual plants, softly pubescent to tomentose. Stems erect or prostrate, dichotomously branched. Leaves basal or nearly so, and entire. Inflorescence cymose. Bracts opposite or verticillate, entire. Involucres sessile, urceolate, 5-6-ribbed and -toothed, the teeth spine-tipped. Flowers 2 or 3 in an involucre, but only one developing, pedicellate, bractlets lacking; perianth 6-parted, the outer segments larger than the inner 3, all entire. Stamens 9, inserted at the base of the perianth.

⁵⁰ *Eriogonella* Goodman, gen. nov. Polygonacearum. Plantae annuae, molliter pubescentes vel tomentosae. Caules erecti aut prostrati, diehotome ramosi. Folia basalia vel subbasalia et integra. Inflorescentia cymosa. Bracteae oppositae aut verticillatae, integrae. Involucra sessilia, ureolata, 5-6-costata dentataque, dentibus in spinis terminatis. Flores 2-3 in involuero (uno flore maturante), pedicellati; bracteoli nulli; perianthum 6-partitum, segmentis integris, exterioribus interioribus 3 majoribus. Stamina 9, ad basem perianthi inserta. Achaenium 3-carpellatum, 3-angulatum; styli 3; stigmatae capitatae; radicula curvata, cotyledones suborbiculati et accumbenti.

Achene 3-carpellate, 3-angled, styles 3, stigmas capitate; radicle curved, the cotyledons suborbicular and accumbent.

Type species: *Eriogonella membranacea* (Benth.) Goodman.

SPECIES EXCLUDED

C. californica (Benth.) Gray, Proc. Bost. Soc. Nat. Hist. 7: 149. 1859 = **Mucronea californica** Benth. Trans. Linn. Soc. Lond. 17: 419, pl. 20. 1836.

C. californica (Benth.) Gray var. *Suksdorffii* Macbride, Contr. Gray Herb. N. S. 53: 6. 1918 = **Mucronea californica** Benth. var. **Suksdorffii** (Macbr.) Goodman, n. comb.

C. floccosa Jones, Contr. West. Bot. 12: 74. 1908 = **Hollisteria lanata** Wats. Proc. Am. Acad. 14: 296. 1879.

C. insignis Curran, Bull. Cal. Acad. Sci. 1: 275. 1885 = **Oxytheca insignis** (Curran) Goodman, n. comb.

C. leptoceras (Gray) Wats. Proc. Am. Acad. 12: 269. 1877 = **Centrostegia leptoceras** Gray, Proc. Am. Acad. 8: 192. 1870.

C. membranacea Benth. Trans. Linn. Soc. Lond. 17: 419, pl. 17, fig. 11. 1836. = **Eriogonella membranacea** (Benth.) Goodman, n. comb.

C. perfoliata Gray, Proc. Bost. Soc. Nat. Hist. 7: 148. 1859 = **Mucronea perfoliata** (Gray) Heller, Muhlenbergia 2: 23. 1905.

C. polygonoides Torr. & Gray, Proc. Am. Acad. 8: 197. 1870 = **Acanthogonium polygonoides** (T. & G.) Goodman, n. comb.

C. rigida (Torr.) Torr. & Gray, l. c. 198. 1870 = **Acanthogonium rigidum** Torr. Pacif. R. R. Rept. 4: 133. 1856.

C. spinosa Wats. Botany [of California] 2: 481. 1880 = **Eriogonella spinosa** (Wats.) Goodman, n. comb.

C. Thurberi (Gray) Wats. Proc. Am. Acad. 12: 269. 1877 = **Centrostegia Thurberi** Gray ex Benth. in DC. Prodr. 14: 27. 1857.

C. Thurberi (Gray) Wats. var. *cryptantha* Curran, Bull. Cal. Acad. Sci. 1: 275. 1885 = **Centrostegia Thurberi** Gray ex Benth., l. c. 1857.

C. Vortriedei T. S. Brandegee, Zoe 4: 158. 1893 = **Centrostegia Vortriedei** (T. S. Brandegee) Goodman, n. comb.

LIST OF EXSICCATAE

The collectors' numbers are printed in *italics*, or, if the collection is unnumbered, it is indicated by a dash. The numbers in parentheses indicate the number assigned to the species in this revision.

- Abbott, E. K. — (14); — (29).
- Abrams, Mrs. J. D. — (21); — (33).
- Abrams, L. R. *3169*, *11016*, *11060* (1); *11754*, *11932a*, (3); *3222* (5); *1218* (7); *1603* (9a); *6516* (10a); *1653* (11); *4047*, *4283* (14); *7443* (16); *205*, *1274*, *1807*, *2554*, *2637*, *4116* (18); *1708* (18a); *3777* (21); *3426* (25); *3661* (26); *7655* (30); *1337* (33a); *3737* (38).
- Abrams, L. R. & E. A. McGregor. *146* (18a); *305* (20).
- Abrams, L. R. & I. L. Wiggins. *66* (24).
- Alderson, R. D. — (21); — (38).
- Andrews, T. L. *13*, *14* (14).
- Angier, B. S. *184* (25).
- Antisell, T. — (26).
- Austin, Mrs. R. M. — (17).
- Bacigalupi, R. *1491* (8a); *1490* (11).
- Baker, C. F. *1092* (3); *2842*, *5072* (9); *4706* (18).
- Baker, M. S. *3097b*, *5360* (31).
- Beard, A. — (5).
- Beller, S. — (1).
- Bigelow, J. M. — (17).
- Blaisdell, F. E. *87* (25).
- Blankinship, J. W. — (17); — (31).
- Blazic, A. — (18).
- Bolander, H. N. —, *112* (9); *1939* (14).
- Bowman, A. M. — (18).
- Braem, S. — (1).
- Brandegee, K. —, *218* (4); — (7); — (9); — (9a); *85* (11); — (13); — (14); — (16); — (17); — (18); — (21); — (23); — (25); — (26); —, *84* (27); — (29); — (30); — (31); — (32); —, *29* (38).
- Brandegee, T. S. — (4); — (5); *1623* (7); — (16); —, *1631* (25); — (34); — (35); — (36); — (37); —, *1638* (38).
- Braunton, E. —, *15*, *275*, *306*, *418* (18).
- Brewer, W. H. —, *893* (16); *445* (18); *456*, *894* (23); *2739* (32).
- Bridges, T. *286* (9).
- Bryan, M. L. *76* (18).
- Bush, Mrs. A. E. — (33a).
- Buttle, A. F. — (26).
- De Camp, I. — (18); — (33).
- Cannan, E. — (9).
- Carlson, J. I. — (5).
- Clark, H. W. — (1); — (18).
- Clary, M. — (20a).
- Clemens, Mrs. Jos. — (11); — (16).
- Clements, F. E. & E. S. *50*, *51*, *52* (25); *49* (38).
- Cleveland, D. — (4); — (21); — (25); — (31); — (38).
- Collins, G. N. & J. H. Kempton. *2*, *167* (25); *253* (26); *183* (38).
- Congdon, J. W. — (13); — (14); — (16); — (17).
- Coombs, Mrs. A. L. — (26).
- Cooper, J. G. *523* (21); — (25).
- Cottam, Stanton & Harrison. *4033* (3).
- Coville, F. V. & F. Funston. *1135* (3); *1033*, *1100* (20); *1090* (32).
- Cox, F. — (33).
- Crawford, D. L. — (18).
- Crow, E. — (18).
- Curran, M. K. — (3); — (9); — (11); — (17); — (32).
- Cusick, W. C. *771*, *1974* (3).
- Davidson, A. *2737* (2).
- Davis, A. *51* (18).
- Davy, J. B. *1882* (20).
- Dearing, Mr. & Mrs. — (8).
- Dobbs, R. J. — (18b).
- Douglas, D. — (8); — (16); — (18).
- Dudley, C. — (16); — (29).
- Dudley, W. R. — (8); — (8a); — (9); — (9a); — (11); — (16); — (18); —, *733* (31).
- Dudley, W. R. & F. H. Lamb. *4556* (20).

- Dunn, A. N. & J. A. Ewan. 7838 (18).
 Dunn, G. W. — (25); — (29); — (38).
 Duran, V. 517 (3).
 Durbrow, P. — (16).
 Eastwood, A. 2708, 3061, 6165, 8071,
 8667, 8910, 16988, 18188, 18246,
 18803 (1); — (2); 3235 (3); 150
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 (18b); 3100 (20); — (22); 15116,
 15127, 15167 (23); 2881, 2886, 2916
 (25); —, 9162 (26); —, 14981, 15121,
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 15015 (30); 15583 (33); 3139 (33a);
 —, 258, 2874 (38).
 Elmer, A. D. E. 3570 (8); 4671 (8a);
 4793 (9); 4828 (9a); 5084a (11);
 4047 (14); 4756 (15); 3253 (16);
 3251 (18); 3689 (18d); 3245 (31).
 Engelmann, G. — (8).
 Epling, C. C. — (5).
 Epling, C. C. & M. — (18); — (18e).
 Epling, C. C. & J. A. Ewan. 7599 (18).
 Evermann, B. W. — (18d).
 Ewan, J. A. 1507, 1509, 1526, 1527 (18);
 2244, 7365, 7586 (18b); 2252 (18c);
 1506 (20).
 Ferris, R. S. 3922a, 3948, 7138, 7222,
 8007 (1); 3728 (2); 7140, 7205 (5);
 7613 (10a); 1696 (16); 953 (18);
 7049 (26).
 Ferris, R. S. & C. D. Duncan. 2205 (32).
 Feudge, J. B. 1644 (29); 240 (33).
 Fish, F. E. — (38b).
 Fisher, G. L. 142 (18).
 Ford, B. — (20).
 Fosberg, F. R. 8066 (1); 8279 (25);
 8277 (26); 8281 (38b).
 Fritchey, J. Q. A. 44 (33).
 Gabel, W. — (10); — (18); — (22).
 Gardner, N. L. 548 (9).
 Geis, H. D. 542 (18); —, 541 (33a).
 Gilman, M. F. — (5).
 Goldman, E. A. 1089 (5).
 Goodding, L. N. 881 (1).
 Goodman, G. J. & C. L. Hitchcock. 1748
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 Grant, A. L. 1685 (27).
 Grant, G. B. 6715 (1); —, 2605 (8);
 —, 169, 3887 (18); 3887 (18b); —,
 171, 6627, 6642 (33); 2607, 6818 (38).
 Greatz, L. A. 455 (33).
 Greene, E. L. — (14).
 Griffiths, D. 3486, 3722, 3981, 3991,
 4395 (1).
 Grinnell, F. 497 (18); — (18b); 110,
 194, 288, 450 (20).
 Hall, H. M. 6029 (1); 9922 (16); 745
 (21); 10033 (32).
 Hall, H. M. & H. D. Babcock. 5081 (20).
 Hall, H. M. & H. P. Chandler. 7262 (2);
 7247 (3).
 Harrison, G. J. 3619 (1); 3615 (5).
 Hart, C. —, 78 (1).
 Hartweg, T. 1936 (8); 1935 (8a); 1938
 (11).
 Hasse, H. E. — (3); — (7); — (8); —
 (18); — (18b); — (18c); — (33a).
 Hayward, I. — (14).
 Heller, A. A. 9680 (1); 9705 (3); 6749
 (8); 5666 (9); 8383 (9a); 6750,
 14404 (11); 7910a (17); 7797 (20).
 Heller, A. A. & H. E. Brown. 5568
 (17).
 Henderson, L. F. 3129, 8987, 8988, 8989
 (3).
 Henshaw, H. W. — (38).
 Herre, A. C. — (25).
 Hill, M. — (5).
 Hillman, F. H. — (3).
 Hitchcock, A. E. 764 (3).
 Hitchcock, A. S. — (26).
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 Hoffmann, R. — (1); —, 458 (2); —
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 — (31).
 Hooker, J. D. & A. Gray. — (18).
 Horn, G. H. — (20).

- Howell, J. T. 2678, 3518, 3555, 4969
 (1); 3982 (2); —, 2518, 4976 (3);
 3497, 3591 (5); 1956, 5271, 5316,
 11430 (9); 4233 (12); 6516 (16);
 —, 2455, 2461, 6585, 6621, 6621a
 (18); 3876 (18b); 5034 (20); 2926
 (21); 6220, 6300 (24); 6634 (25);
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 (33); 2481 (38); 4856 (38a).
- Howery, C. E. — (33).
- Hutchinson, S. — (12).
- Ingalls, M. P. — (10a).
- Jaeger, E. C. —, 214 (1); — (3); 213
 (5); — (20a); — (21); — (26);
 1058 (33).
- Johansen, D. A. & J. A. Ewan. 7139 (5).
- Johnson, E. R. — (26).
- Johnson, J. E. — (1).
- Johnston, I. M. — (1); — (3); —
 (18); —, 27P (18b); — (33).
- Jones, M. E.—, 5024av, 5036ap, 5045ao,
 5110al (1); —, 25732 (2); —, 2995
 (3); — (5); — (7); —, 3327 (8a);
 —, 186, 2336 (9); 28863 (12); 2253
 (14); — (18); — (18a); — (18b);
 — (20); — (20a); —, 3234 (23); —
 (25); — (26); —, 3181 (33); —,
 3159 (38); — (39).
- Jussel, M. S. 143, 276 (31).
- Kearney, T. H. 72 (32).
- Keck, D. & McCully. 88 (1); 67 (26).
- Kelley, E. — (18).
- Kellogg, A. & W. G. W. Harford. 865
 (7); —, 6 (9); — (25).
- Kelly, J. — (16).
- Kennedy, P. B. 1851 (1); 1308, 4536
 (3).
- Lathrop, L. M. — (27).
- Leiberg, J. B. 2225 (3); 3381a (18);
 3381b (18b); 3300 (33).
- Lemmon, J. G. — (1); —, 204 (3); —
 (8); — (20); — (27a).
- Lemmon, J. G. & wife. — (1); — (5).
- Linsdale, Dr. and Mrs. — (16).
- Lyon, W. B. — (18); — (38a).
- Macbride, J. F. 1033 (2); 159 (3).
- Macbride, J. F. & E. B. Payson. 3024
 (2); 2848 (3); 717, 815 (18).
- MacFadden, F. 8 (18).
- Mason, H. L. — (16).
- Mathias, M. E. 806 (1); 874 (3).
- McDonald, J. — (30).
- McGregor, E. A. 42 (8); 62, 1015 (26).
- McMurphy, J. — (16); — (17).
- Mearns, E. A. 3145 (1); 3032, 3199,
 3243 (26).
- Michaels, E. — (2).
- Michener, C. A. & F. T. Bioletti. —
 (9).
- Miller, C. E. — (24).
- Mohr, P. F. — (1).
- Monks, S. P. 36 (18).
- Moore, J. P. — (9).
- Munz, P. A. 2601 (1); 9275 (11); 2791
 (18); 7085 (18c); 4654, 11426 (20);
 11919 (20a); 9481, 9843, 10879 (21);
 8060, 9624 (26); 2790a (33); 2790,
 7958 (38); 8192, 10372 (38a).
- Munz, P. A. & E. Crow. 11679 (24).
- Munz, P. A. & R. D. Harwood. 3517,
 3618 (1); — (5); 3924 (18); 3715,
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 3858 (25); 7145 (26); 7146 (38);
 3897 (38a).
- Munz, P. A. & C. L. Hitchcock. 12776
 (3); 10952 (5); 11366 (26).
- Munz, P. A. & R. Hoffmann. 11734 (7).
- Munz, P. A. & I. M. Johnston. 5175
 (1); 5364 (7); 5318, 12618 (25);
 5359 (33).
- Munz, P. A. & D. Keck. 4859 (1); 7066
 (18).
- Munz, P. A. & B. Norris. 11847 (24).
- Nelson, A. & J. F. Macbride. 1171 (2);
 1875 (3).
- Nevin, J. C. 18 (18).
- Newell, G. — (8a).
- Norton, A. — (16); — (29); — (32).
- Norton, M. E. — (8).
- Nott, C. P. — (8).
- Nuttall, T. — (8); — (25); — (38).
- Oreutt, C. R. — (1); — (4); —, 91
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 1369 (34); — (38); 877 (39).
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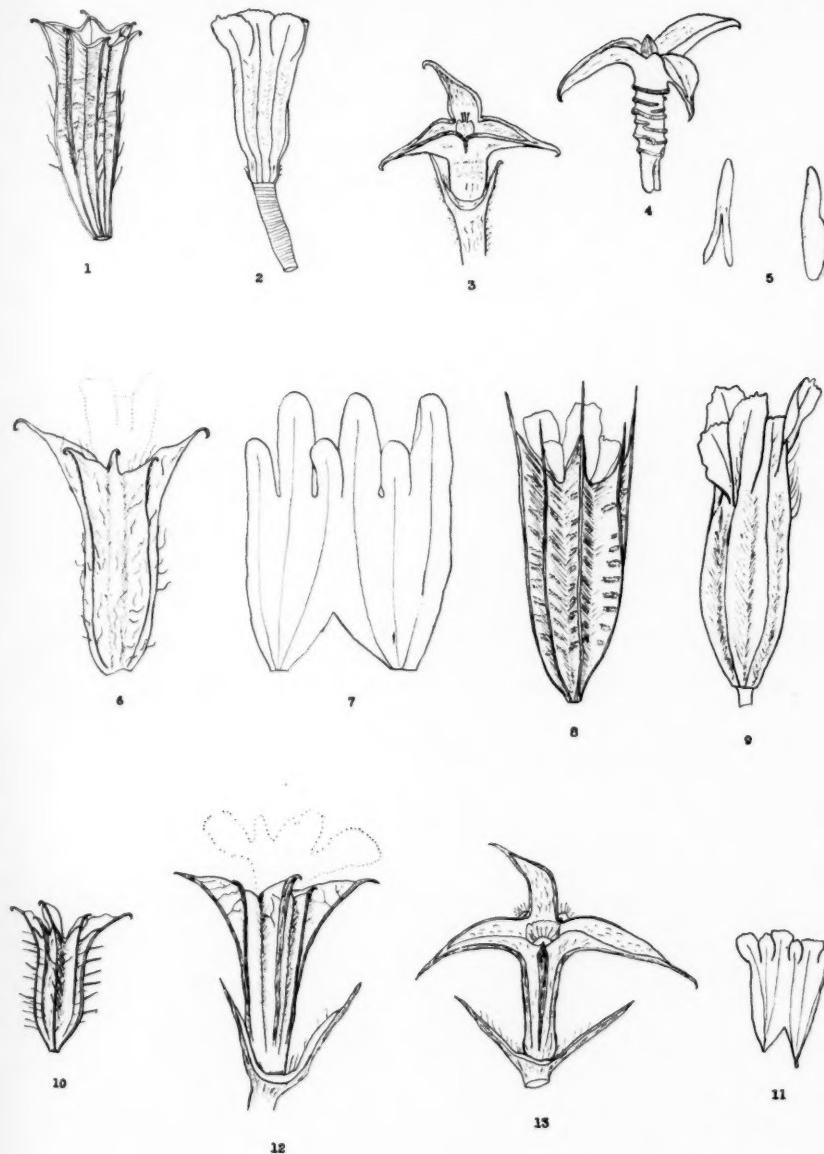
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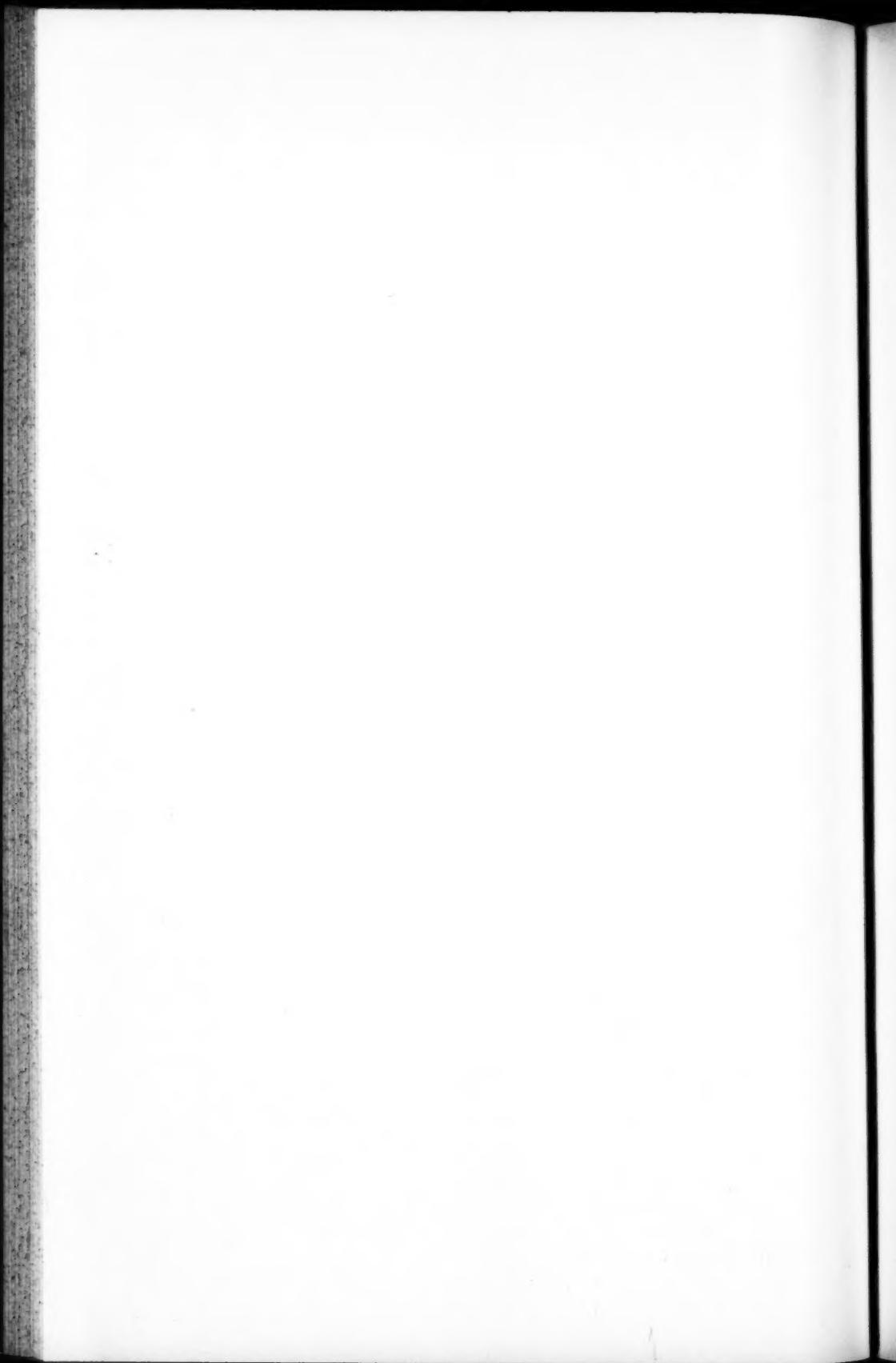
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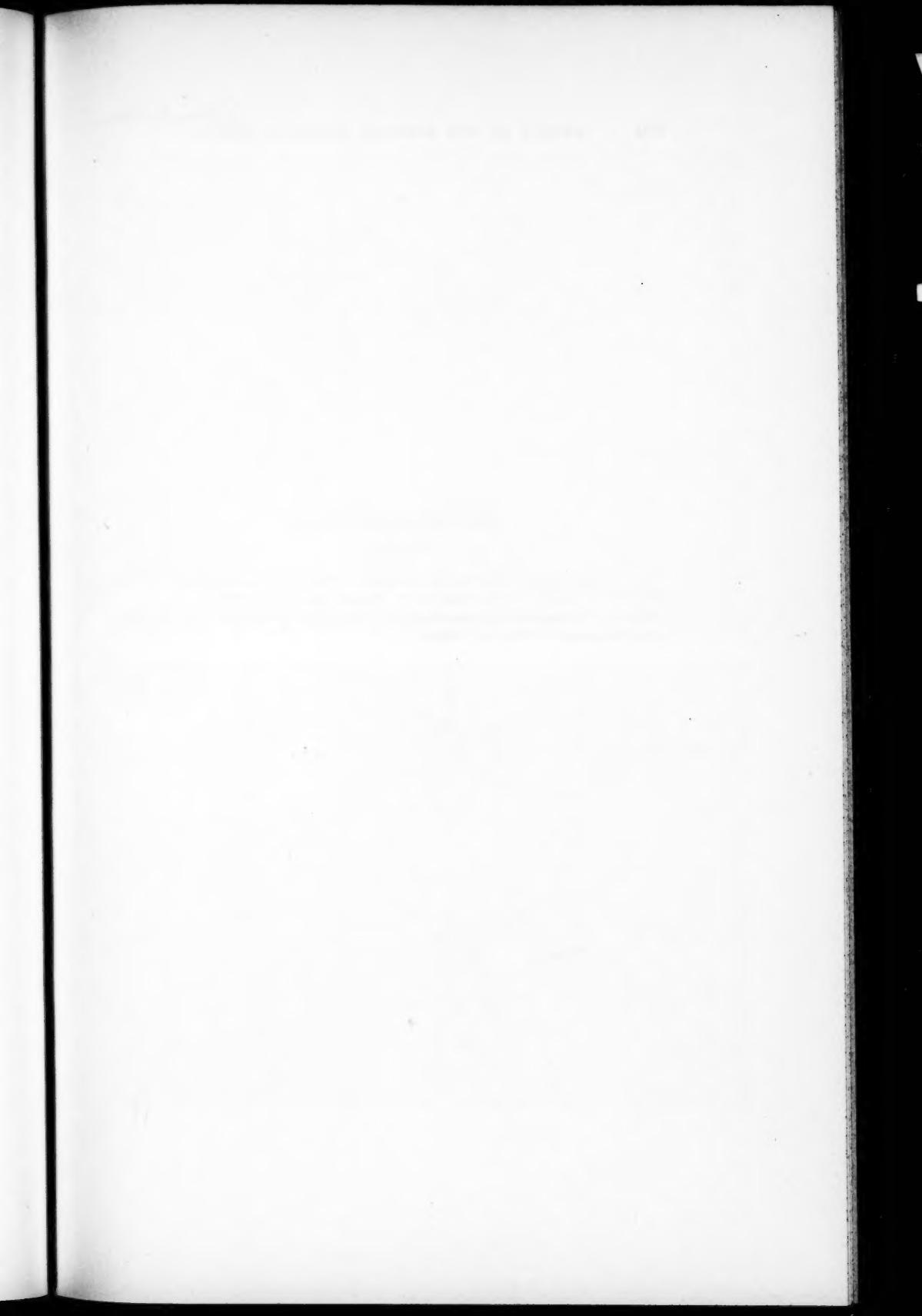
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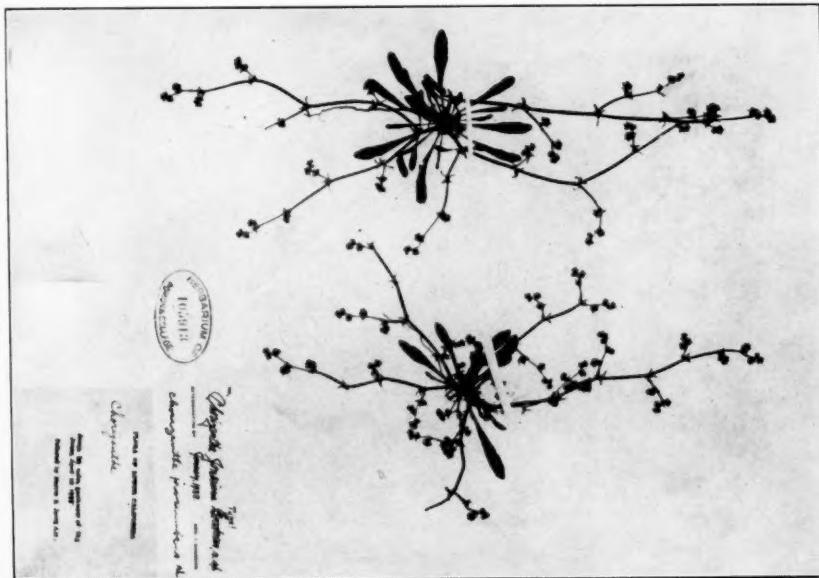
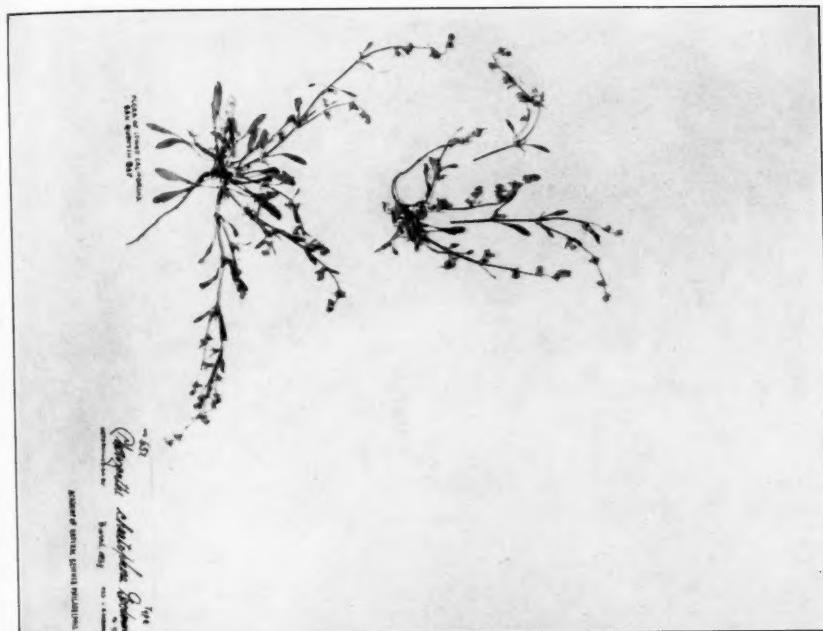
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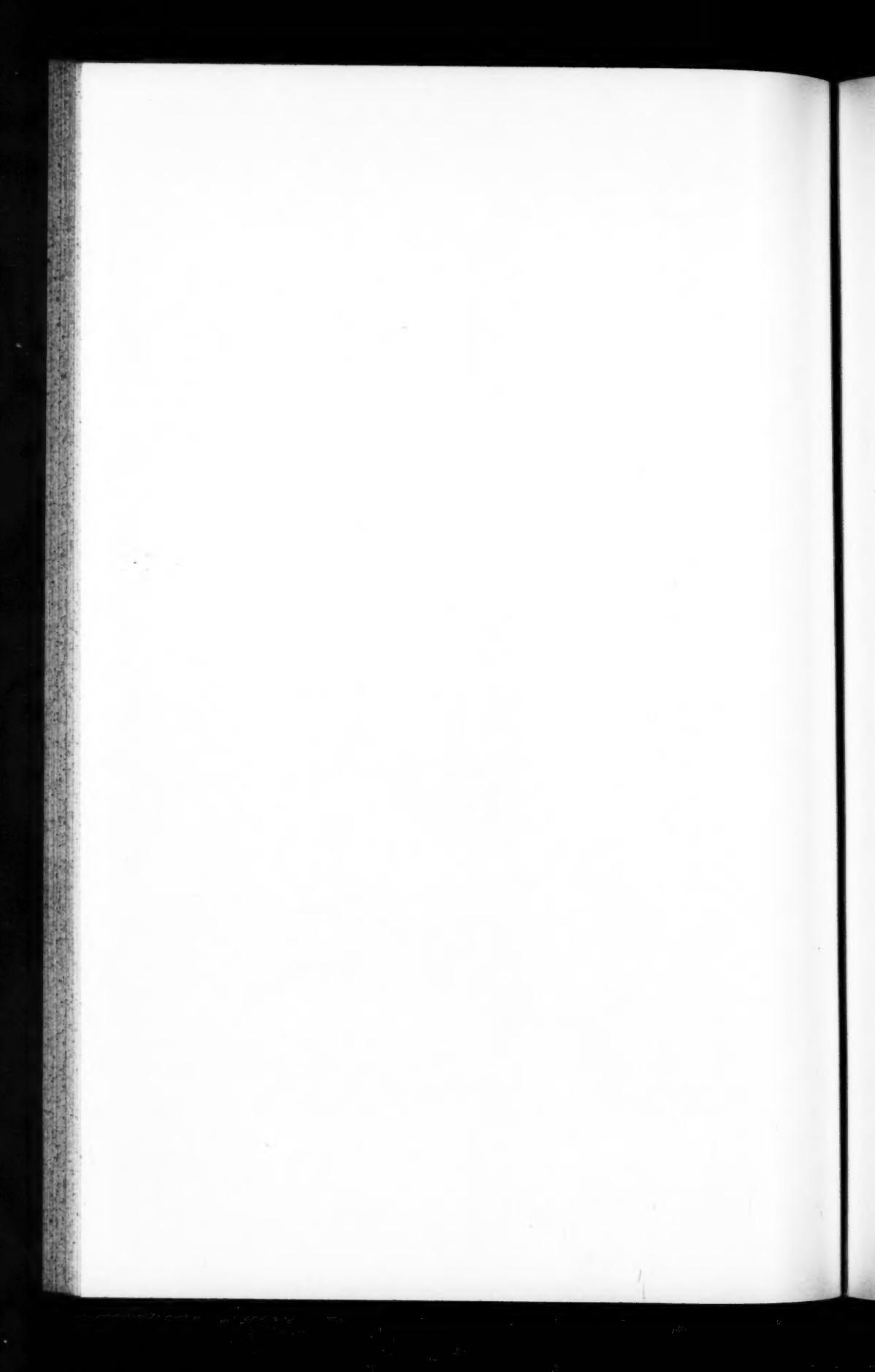
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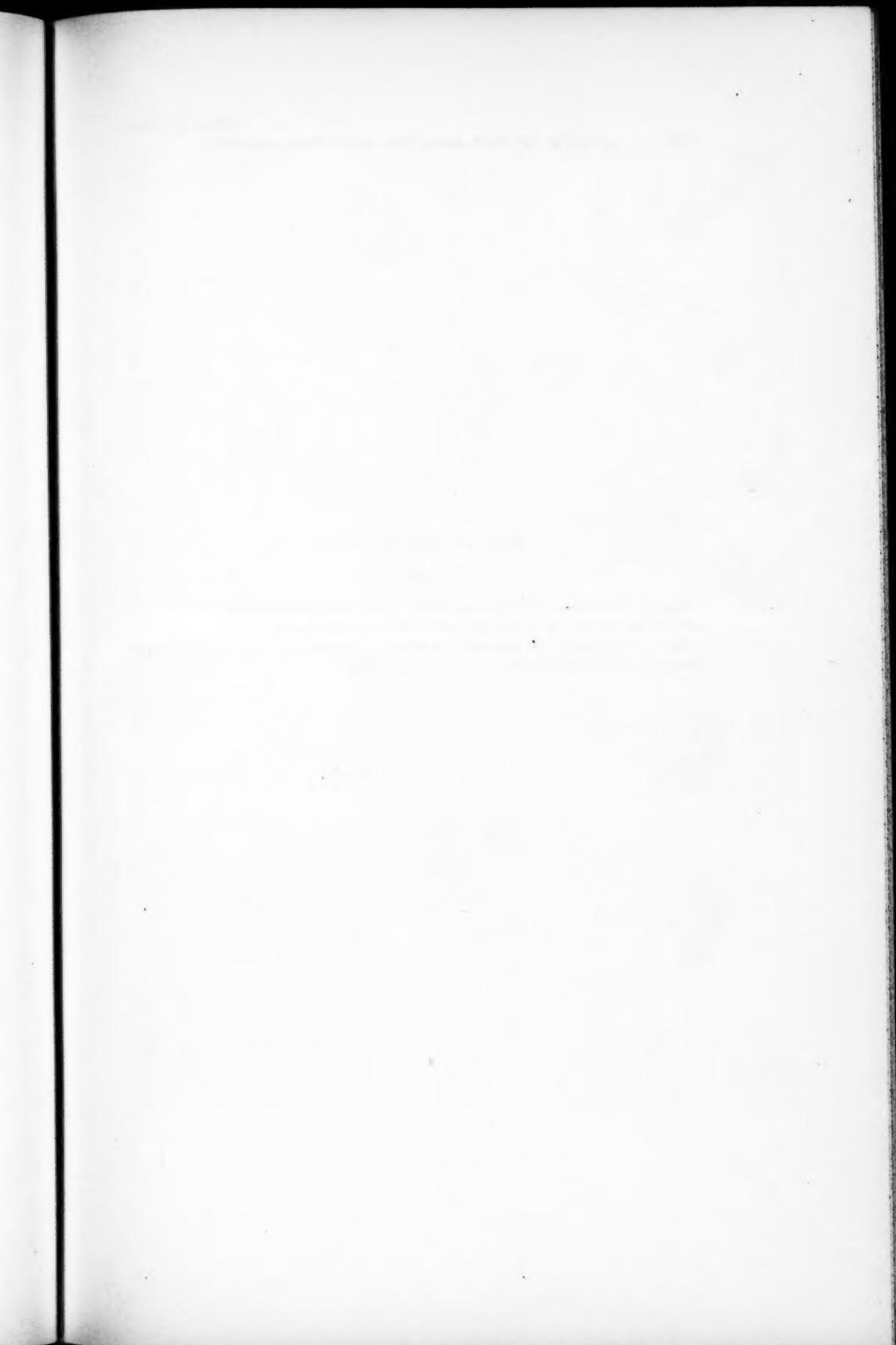
PLATE 2

Fig. 1. *Chorizanthe chaetophora* Goodman. From the type specimen, Palmer 652, in the Herbarium of the Academy of Natural Sciences of Philadelphia.

Fig. 2. *Chorizanthe Jonesiana* Goodman. From the type specimen, M. E. Jones, in the Herbarium of Pomona College.







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PLATE 3

Fig. 1. *Chorizanthe Howellii* Goodman. From the type specimen, J. T. Howell 4233, in the Herbarium of the California Academy of Sciences.

Fig. 2. *Chorizanthe chrysacantha* Goodman. From the type specimen, Muns & Harwood 3775, in the Herbarium of Pomona College.

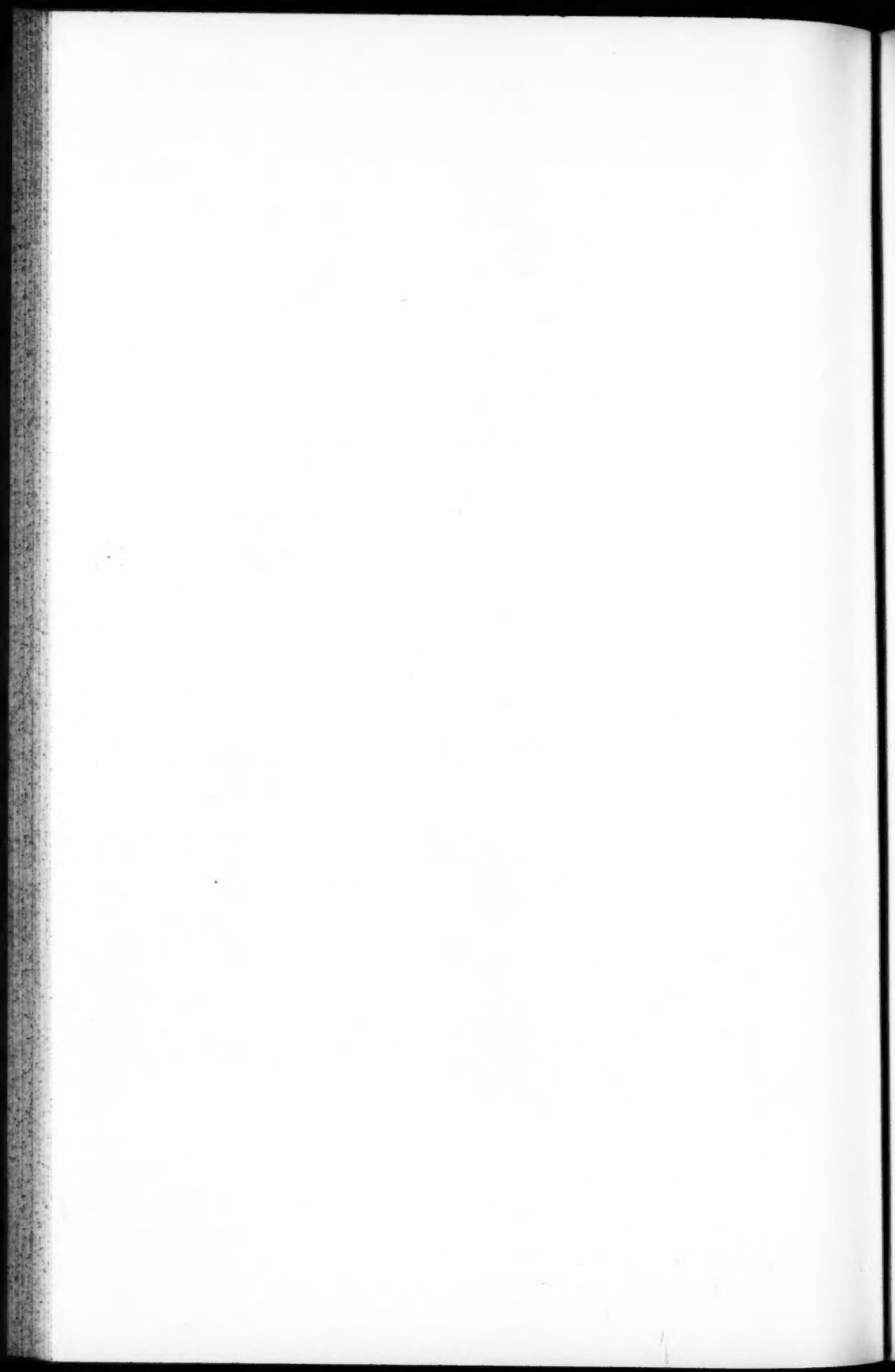


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GOODMAN—NORTH AMERICAN SPECIES OF CHORIZANTHE



2



A MONOGRAPH OF THE GENUS MENTZELIA¹

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HISTORY

The genus *Mentzelia*, named for Christian Mentzel, a German botanist of the early seventeenth century, was first described by Plumier² in 1703 from a plant collected by him in the West Indies (1689-91). The specimen on which the generic description was based was given the scientific name, *Mentzelia aspera*, by Linnaeus³ in 'Species Plantarum,' 1753, and constitutes the type species for the genus. Willdenow,⁴ in 1799, added one new species, namely, *hispida*. In 1804 a new family, Loasaceae, was described by Jussieu,⁵ based on the two genera, *Mentzelia* and *Loasa*. Previous to this date, these two genera had been included by the majority of botanists in the *Onagraceae*.

A new genus, *Bartonia*, closely related to *Mentzelia*, was published by Sims,⁶ in 1812, from plants sent by Thomas Nuttall⁷ from western North America. The communication, including the description of one species, *decapetala*, was made by Pursh.⁸ A new species, *Mentzelia oligosperma*, was listed in Fraser's Catalogue⁹ in 1813, a detailed description appearing two years later.¹⁰

¹ An investigation carried out at the Missouri Botanical Garden in the Graduate Laboratory of the Henry Shaw School of Botany of Washington University and submitted as a thesis in partial fulfillment of the requirements for the degree of doctor of philosophy in the Henry Shaw School of Botany of Washington University.

² Plumier, C., Nov. Pl. Am. Gen. 40. 1703.

³ Linnaeus, C., Sp. Pl. ed. 1. 516. 1753.

⁴ Willdenow, C. L., Sp. Pl. 2^o: 1175. 1799.

⁵ Jussieu, A., Ann. Mus. Nat. Hist. 5: 18. 1804.

⁶ Sims, J., in Bot. Mag. pl. 1487. 1812.

⁷ Nuttall, T., Gen. 1: 297. 1818.

⁸ Pursh, F., Fl. Am. Sept. 1: 327. 1814, as *B. ornata*.

⁹ Fraser, Cat. Pl. 1813 [reprinted in Pittonia 2: 116. 1890].

¹⁰ Nuttall, T., in Sims, Bot. Mag. 42: pl. 1760. 1815.

Issued April 12, 1934.

Though the genus *Bartonia* Sims was retained for a number of years as a valid genus of the *Loasaceae* and various new species described under it, the generic name *Bartonia* was first used by Willdenow¹¹ in 1801 for a plant belonging to the *Gentianaceae*.

A great deal of confusion arose concerning the correct authority for two species published as *Bartonia ornata* and *B. nuda* Pursh. They were described first by Pursh,¹² in 1814, from plants collected by Nuttall in the region of the upper Missouri. Later, Nuttall¹³ described the same two species as new in 1818. Various persons have listed these two species, *ornata* and *nuda*, as belonging to either Nuttall or Pursh. Rafinesque,¹⁴ aware that *Bartonia* had been used earlier to designate a group of plants in another family, proposed the name *Nuttallia* for that of the previously used *Bartonia*. The generic name was not taken up as a valid genus until a number of years later.

The first Mexican and South American species of *Mentzelia* to be described were *strigosa* and *scabra*, in 1823, from collections made by Humboldt and Bonpland.¹⁵ When De Candolle's 'Prodromus' appeared in 1828,¹⁶ six species of *Mentzelia*, including a new one from Mexico, *stipitata*, and two species of *Bartonia* were given.

A new generic segregate, *Acrolasia*, was proposed in 1835, by Presl,¹⁷ with one species, *bartonioides*. In Don's¹⁸ taxonomic treatment of the genus, 1834, the two genera *Mentzelia* and *Bartonia* were maintained with a total of fourteen species. Spach,¹⁹ in 1838, recognized the three genera, *Acrolasia* Presl, *Bartonia* Pursh, and *Mentzelia* L., and placed them under Section 1. *Bartolineae* of the family *Loasaceae*.

¹¹ Willdenow, C. L., Ges. Naturf. Freunde Berlin, Neue Schrift. 3: 444-445. 1801.

¹² Pursh, F., Fl. Am. Sept. 1: 327, 328. 1814.

¹³ Nuttall, T., Gen. 1: 299. 1818.

¹⁴ Rafinesque, C., in Am. Month. 175. 1818

¹⁵ Humboldt, Bonpland & Kunth, Nov. Gen. & Sp. 6: 95-96. 1823.

¹⁶ De Candolle, A. P., Prodr. 3: 343. 1828.

¹⁷ Presl, K. B., Reliq. Haen. 2: 39, pl. 55. 1835.

¹⁸ Don, G., Hist. Dichl. Pl. 3: 65. 1834.

¹⁹ Spach, E., Hist. Nat. Veg. 6: 236-240. 1838.

Two other generic segregates, *Creolobus*²⁰ in 1839 and *Chrysostoma*²¹ in 1840, were published by Lilja and almost immediately reduced to synonymy under *Mentzelia*.

In 1834, Hooker,²² in going over the Douglas manuscript, found three new species which he published, namely, *laevicaulis*, *parviflora*, and *albicaulis*, under *Bartonia*. Douglas was uncertain whether or not *albicaulis* should belong to *Bartonia* or to *Mentzelia*. In 1840 Torrey and Gray²³ gave the first comprehensive treatment of the group of North American species. The generic name of *Mentzelia* was retained and *Acrolasia*, *Bartonia*, and a new generic segregate of Nuttall, *Trachyphytum*, were all reduced to synonymy. At this time twelve species were given, including five new ones under three sections, *Eumentzelia*, *Trachyphytum*, and *Bartonia* of Nuttall, not Willdenow.

In 1840 Eaton and Wright²⁴ published the name *Touterea* and referred to it two species, *ornata* and *nuda*. These names were soon reduced to synonymy under *Mentzelia*. Three years later, Walpers²⁵ recognized *Acrolasia*, *Bartonia*, and *Mentzelia*, as genera of equal rank; and under the latter he indicated three sections, *Eumentzelia*, *Trachyphytum*, and *Microsperma*, together including ten species. Two new South American species *Mentzelia chilensis* and *Acrolasia Solierii*, were added by Gay²⁶ in 1846. The following year Hooker²⁷ listed five species, including a new one, *micrantha*, together with a great deal of synonymy.

The next few years, following various explorations, chiefly in the Southwest, resulted in the publication of several heretofore undescribed species. In 1850, Gray²⁸ definitely placed *Microsperma* as a synonym under *Eucnide*, removing it from

²⁰ Lilja, N., Fl. öfver Sver. odl. Vext. 67. 1839.

²¹ Lilja, N., Fl. öfver Sver. odl. Vext. Suppl. 1: 33. 1840.

²² Hooker, W. J., Fl. Bor. Am. 1: 221-222. [1834] 1840.

²³ Torrey, J. and Gray, A., Fl. N. Am. 1: 534-537. 1840.

²⁴ Eaton, A. and Wright, J., N. Am. Bot. 454. 1840.

²⁵ Walpers, G. G., Rep. Bot. Syst. 2: 224. 1843.

²⁶ Gay, C., Fl. Chile 2: 431. 1846.

²⁷ Hooker, W. J., Lond. Jour. Bot. 6: 226. 1847.

²⁸ Gray, A., Boston Jour. Nat. Hist. [Pl. Lindheimeri, pt. 2] 6: 191. 1850.

Mentzelia, with which it had been confused. The period from 1876 to 1900 added a number of new species. Urban and Gilg's²⁹ monographic treatment of the *Loasaceae* appeared in 1900. Seven sections, some of them new, were maintained under the genus *Mentzelia*, comprising in all forty-seven species of North and South America, fourteen of the group newly described.

Cockerell, in 1901,³⁰ added another generic segregate, *Hesperaster*, transferring thereto several species from *Mentzelia*. The following year Osterhout³¹ described two new species under the generic name *Hesperaster*. Rydberg³² revised the genus *Mentzelia*, maintaining *Acrolasia* and *Touterea* and adding a new genus, *Bicuspidaria*, all of which were given equal generic rank with *Mentzelia*.

Nuttallia of Rafinesque was reinstated as a good genus in 1906 by Dr. Greene.³³ The same year Davidson³⁴ made an incomplete revision of some of the western species of *Mentzelia*. This was followed a few years later by an excellent treatment of the section *Trachyphytum* by Macbride.³⁵

Since the publication of Urban and Gilg's monograph in 1900, several species have been published as new to science. The five genera, *Acrolasia*, *Nuttallia*, *Touterea*, *Bicuspidaria*, and *Mentzelia*, have been kept as valid genera by certain authorities, especially in some of the manuals and local floras.

It has been the aim of the writer to bring together as completely as possible all the historical data relating to the genus, as well as the results of a critical study of recent collections, thereby clarifying synonymy and also establishing the natural relationships of the various entities concerned.

The writer is indebted to Dr. George T. Moore, Director of the Missouri Botanical Garden, where this study was under-

²⁹ Urban, I. & Gilg, E., Monographia Loasacearum. Nov. Act. Nat. Cur. [Abh. K. Leop.-Carol. Deutsch. Akad. Naturf.] 76: 22-97, 356-358. 1900.

³⁰ Cockerell, T. D. A., in Torreya 1: 142. 1901.

³¹ Osterhout, G., in Bull. Torr. Bot. Club 29: 174. 1902.

³² Rydberg, P. A., in Bull. Torr. Bot. Club 30: 275. 1903.

³³ Greene, E. L., Leaflets Bot. Obs. & Crit. 1: 210. 1906.

³⁴ Davidson, A., in Bull. So. Calif. Acad. Sci. 5: 14. 1906.

³⁵ Macbride, J. F., in Contr. Gray Herb. N. S. 56: 24-28. 1918.

taken, for the privilege of using the library and herbarium. She extends especial thanks and appreciation to Dr. J. M. Greenman for his kindly interest and supervision throughout the preparation of this monograph. The writer also wishes to thank Dr. Roland V. La Garde and Mr. Ward M. Sharp for the photographs taken in connection with the illustrations used in this paper. Grateful appreciation is extended to those in charge of the following herbaria for the generous loans of material necessary for this study: the United States National Museum; the Field Museum of Natural History; Kew Herbarium; the Natural History Museum of Vienna; the California Academy of Sciences; University of California Herbarium; the Dudley Herbarium of Leland Stanford Jr. University; the Academy of Natural Sciences of Philadelphia; Pomona College Herbarium; the Rocky Mountain Herbarium, University of Wyoming; Frank W. Peirson Herbarium; University of Michigan Herbarium; University of Arizona Herbarium; University of Montana Herbarium.

ABBREVIATIONS

The following abbreviations have been used in citations to indicate the different herbaria from which material has been obtained for study:

- A = University of Arizona Herbarium.
- ANSP = The Academy of Natural Sciences of Philadelphia.
- C = University of California.
- CAS = California Academy of Sciences.
- D = Dudley Herbarium of Leland Stanford Jr. University.
- F = Field Museum of Natural History.
- K = Kew Herbarium.
- M = Missouri Botanical Garden.
- MH = University of Michigan Herbarium.
- P = Pomona College.
- PH = Frank W. Peirson Herbarium.
- RM = Rocky Mountain Herbarium, University of Wyoming.

- UM = University of Montana.
US = United States National Museum.
V = Natural History Museum of Vienna.

GENERAL MORPHOLOGY

The genus *Mentzelia* includes annual or perennial, rarely biennial, herbaceous plants, which become ligneous or often suffruticose. The latter condition is characteristic of a few species of the *Eumentzelia* section.

Roots.—The annuals have a small tap-root with small lateral roots. The perennial species usually have a strong woody root, rarely a creeping rootstalk, more or less fusiform or thickened.

Stems.—The stems are erect or decumbent at the base, simple or branched below, few to several, often caespitose. The annuals assume a slender appearance, whereas the perennials are ordinarily stouter, coarser, and large. The stem may be glabrous, especially the older parts, or with varying degrees of hirsute pubescence. The bark or outer epidermis often appears shining white, breaking and disintegrating readily. The white stems are characteristic of a number of species, especially in the section *Trachyphytum* and occasionally in the *Bartonia* group.

Leaves.—The leaves are usually alternate, rarely subopposite and decussate as in *M. aborescens* and a few other members of the *Eumentzelia* section. The leaf shapes vary greatly, even on the same plant. The leaves are mostly sessile in the *Trachyphytum*, *Bicuspidaria*, and *Bartonia* sections, rarely petiolate, variously lobed, pinnatifid or entire.

The degree of pubescence varies on the two surfaces of the leaf; usually the pubescence is greater on the lower surface and veins. The young leaves are somewhat more pubescent than others. Petioles, if present, are usually short and pubescent, rarely glabrous.

Pubescence.—The peculiar hairs present in *Mentzelia* in many cases furnish an excellent basis for specific differentiation. The hairs are of three general types, namely, tapering

spine-like hairs, Chinese pagoda-like hairs, which are broad at the base and referred to as glochidiate hairs, and those with tuberculate "stem" and harpoon top, or with a smooth stem and harpoon top. The usual form is the glochidiate type, of varying lengths, often appressed, especially on the leaves and stem.

Where abundant moisture is available the pubescence is scattered. In the more arid localities it is more copious and denser, with a reduction of leaf surface.

Inflorescence.—The inflorescence is terminal, cymose, one to many-flowered, often subtended by ovate deltoid lanceolate linear subulate bracts, which are simple, entire, or variously lobed or pinnatifid, and pubescent as on the leaves. The subtending bracts are usually green in color, though they may become membranous or scarious as in *M. involucrata* and *M. congesta*. The flowers are perfect, regular, and five-parted.

Calyx.—The calyx is five-parted, obtuse, ovate, acute, lanceolate, or long-acuminate, becoming subulate, frequently ciliate on the margins, with prominent veins of one to three. The inner surface is slightly villous, the outer surface variously pubescent, affording with other characters a basis for specific delimitation.

Corolla.—The color of the petals varies from almost white to greenish-yellow and deep orange. Occasionally a deeper color appears at the very base of the petal. A vermillion spot occurs at the base of the petal in *M. Lindleyi* and closely allied species. The petals may be connate, obovate, oblong-obovate, acute, or apiculate at the apex, rarely emarginate, narrowed at the base into a claw, and glabrous or pubescent.

Stamens.—The stamens present a valuable specific character. The filaments are linear or petaloid, the outer row often sterile, seldom antheriferous if assuming a petaloid form, bicuspitate at apex in the section *Bicuspidaria*. The stamens may be few, small, and all linear as in most of the *Trachyphytum* group, or numerous and either all linear or the outer row petaloid as in *Bartonia*.

Hypanthium.—The hypanthium is three-celled, opening by

valves at the summit, rarely splitting longitudinally, with or without persistent calyx-lobes, pubescent in varying degrees, sessile or pedicellate.

Fruit.—The fruit of *Mentzelia* is a capsule with few to numerous seeds, with or without lamellae.

Seeds.—The seeds are winged, margined, or marginless. The shape and markings of the seeds have furnished constant dependable characters for separating species and a secondary sectional character.

GENERIC RELATIONSHIPS

The genus *Mentzelia* is placed in the Mentzelioideae tribe of the Loasaceae, together with two other genera, namely, *Eucnide* and *Sympetaleia*, because of the number of stamens ranging from ten to indefinite and because of the absence of nectary-producing squamellae. *Mentzelia* is the only genus representing the subtribe Mentzelieae distinguished by the three parietal placentae and the ovules appearing in one or two series on each placenta. In the subtribe Eucnideae, which includes the two genera *Eucnide* and *Sympetaleia*, the ovules are in numerous series on each placenta.

The petals in the genus *Mentzelia* are free, whereas in *Eucnide* they are connate and in *Sympetaleia* they form an elongated tube with the filaments adnate to the tube. Stinging hairs are present in *Eucnide* and absent in *Mentzelia*. *Eucnide* and *Mentzelia* have two-celled anthers distinguishing them from *Sympetaleia*, which has one-celled anthers.

GEOGRAPHICAL DISTRIBUTION AND PHYLOGENY

The genus *Mentzelia* is a group of mesophytic and xerophytic plants having a distribution chiefly in western America. With the exception of *M. floridana* and *M. aspera* the genus extends from central United States to the Pacific coast, and from adjacent Canada south to Argentina, South America. *Mentzelia floridana* is found in Florida and the Bahama Islands and is closely related to *M. Lindheimeri* in Texas and Mexico. The species *M. aspera* has the most widespread distribution of the

entire group, occurring in the subtropical regions of the West Indies and from southern Arizona southward to Argentina.

The species of the *Eumentzelia* section present a homogeneous group of more or less closely related forms. The plants comprising the *Eumentzelia* and *Bartonia* sections, on account of the frequently perennial habit and prevailingly undivided leaves, probably represent the more primitive characters of the genus and are thought to have originated from a suffruticose or arborescent ancestor which had its distribution in Mexico. The *Eumentzelia* section is mostly distributed in Mexico and Lower California southward into South America, with four species, *aspera*, *asperula*, *oligosperma*, and *floridana*, occurring within the boundaries of the United States. The *Bartonia* group is represented in South America by a single species which is also indigenous to Texas, Oklahoma, and Mexico. The group is generally distributed throughout the plains states, Rocky Mountains, and Pacific Coast regions.

The annuals constitute the two sections, *Trachyphytum* and *Bicuspidaria*, and represent the more advanced forms of *Mentzelia*. It is within these two groups that the greatest variation in leaf and flower structure is manifest. The *Bicuspidaria* section is represented in southern California, Arizona, Mexico, and Lower California. The species of the section *Trachyphytum* are distributed mostly in the Rocky Mountains and along the Pacific coast from British Columbia to Lower California. Four species of this section occur in South America.

There are apparently two centers of distribution, one in Mexico, and the other in the southwest portion of the United States in the region from New Mexico to southern California.

TAXONOMY

Mentzelia [Plumier] Linn. Sp. Pl. ed. 1. 516. 1753; Gen. Pl. ed. 1. 338, n. 847. 1737, and ed. 5. 233, n. 595. 1754; Hort. Cliff. 492. 1737; Syst. ed. 10. 1076. 1759; Juss. Gen. Pl. 321. 1789; Lunan, Hort. Jam. 1: 504. 1814; HBK. Nov. Gen. & Sp. 6: 119. 1823; Kunth, Syn. Pl. 3: 404. 1824; Torrey & Gray, Fl. N. Am. 1: 532. 1840; DC. Prodr. 3: 343. 1828; G. Don, Hist. Dichl. Pl.

3: 65. 1834; Endl. Gen. 390, No. 5111. 1840; Walp. Rep. Bot. Syst. 5: 776. 1845-46; Brewer & Watson, Bot. Calif. 1: 235. 1876; Baillon, Hist. Pl. 8: 465. 1886; Greene, Fl. Francisc. 232. 1891; Greene, Man. Bot. Reg. San Francisco Bay, 141. 1894; Gilg in Engl. & Prantl, Nat. Pflanzenfam. 3^{te}: 109. 1894, and ed. 2. 21: 532. 1925; Chapman, Fl. Southeast. U. S. ed. 3. 107. 1897; Howell, Fl. N. W. Am. 1: 239. 1897; Urban & Gilg in Nov. Act. Nat. Cur. [Abh. K. Leop.-Carol. Deutsch. Akad. Naturf.] 76: 22-23. 1900; Small, Fl. Southeast. U. S. 809. 1903; Rydb. Fl. Colo. 234-236. 1906; Piper in Contr. U. S. Nat. Herb. [Fl. Wash.] 11: 436. 1906; Gray, Man. Bot. ed. 7. 588. 1908; Coulter & Nelson, Man. Bot. Rocky Mts. 324. 1909; Britton & Brown, Ill. Fl. ed. 2. 2: 566. 1913; Piper & Beattie, Fl. Southeast. Wash. & Adj. Idaho, 166. 1914; Wooton & Standley in Contr. U. S. Nat. Herb. [Fl. N. Mex.] 19: 436. 1915; Rydb. Fl. Rocky Mts. & Adj. Plains, 574. 1922; Davidson & Moxley, Fl. So. Calif. 239. 1923; Tidestrom in Contr. U. S. Nat. Herb. [Fl. Utah & Nev.] 25: 361. 1925; Jepson, Man. Fl. Pl. Calif. 648. 1925; Fawcett & Rendle, Fl. Jam. 5: 247. 1926; Rydb. Fl. Prairies & Plains Cent. N. Am. 558. 1932.

Mentzelia Plumier, Nov. Pl. Am. Gen. 40, pl. 6. 1703; Linn. Gen. Pl. ed. 1. 338, n. 847. 1737; Hort. Cliff. 492. 1737.

Bartonia Sims, in Bot. Mag. pl. 1487. 1812.

Nuttallia Raf. in Am. Month. 175. 1818.

Torreya Eaton, Man. Bot. ed. 5. 420-421. 1829, and ed. 6. 367. 1833.

Acrolasia Presl, Reliq. Haenk. 2: 39. 1835.

Creolobus Lilja, Fl. öfver Sver. odl. Vext. 67. 1839.

Microsperma Hook. Ic. Pl. pl. 234. 1839.

Chrysostoma Lilja, Fl. öfver Sver. odl. Vext. Suppl. 1: 33. 1840; Linnaea 15: 263. 1841.

Touterea Eaton & Wright, N. Am. Bot. 454. 1840.

Trachiphytum Nutt. ex Torrey & Gray. Fl. N. Am. 1: 533. 1840.

Hesperaster Cockerell in Torreya 1: 142. 1901.

Bicuspidaria Rydb. in Bull. Torr. Bot. Club 30: 275. 1903.

Annual or perennial, rarely biennial herbs, shrubs, or

rarely, trees, erect or trailing, freely branching, covered with various types of rigid tenacious barbed hairs, never stinging. Stems becoming white and shining in most species, scabrous or glabrous. Leaves alternate, rarely opposite, 3-5-lobed, coarsely toothed or pinnatifid, sessile to long-petiolate. Inflorescence terminal, cymose. Flowers 1 to many at apex of branches, sessile or shortly pedicellate, small or large, mostly white, yellowish, golden-yellow or orange, subtended by bracts. Calyx-tube cylindrical to ovoid or turbinate, sessile or pedicellate. Calyx-limb 5-lobed, imbricated, deciduous or persistent and withered in the mature fruit. Petals 5-10, imbricated, free or inconspicuously united at the base, obovate to obovate-oblong, rarely spatulate, narrowed or contracted at base, apiculate at apex, glabrous or pubescent on dorsal surface. Stamens numerous, 10-200, free from the petals but inserted with them on the throat of the calyx; filaments distinct, or in clusters opposite the petals, equal in length or the outer series longer, filiform or linear or the 10 exterior broadened, dilated to spatulate or petal-like, in 1 to 5 series, deciduous, always inflexed or incurved at the apex, rarely the 5 exterior ones sterile. Anthers introrse, bilocular, laterally dehiscent, attached at base or dorsal side. Style elongated, filiform, often twisted, smooth, angled, usually persistent in fruit, apex 3-cleft with usually 3 stigmatic surfaces, papillose. Disk concave, glabrous, or rarely pilose. Ovary unilocular, 2-80 ovules. Ovules anatropous, pendulous or horizontally placed, few to many in 1 or 2 rows on 3, rarely 5-7, filiform to linear, inconspicuous or prominent, smooth or incised, parietal placentae; funicle small or lacking. Fruit a short cylindrical, oblong, or turbinate capsule, sessile or pedicellate, more or less densely ribbed at maturity, pericarp papery to somewhat woody, 3-7-valved or irregularly truncate at apex. Seeds in 1 or 2 series, flat or angled, with or without wings, testa papery or somewhat leathery, opaque or shiny, smooth, punctate or striate. Endosperm copious or scanty to almost lacking. Embryo erect or curved, radicle conic or nearly cylindrical, obtuse or somewhat acute, longer or shorter than the flattish cotyledons.

Type species: *Mentzelia aspera* Linn. Sp. Pl. 516. 1753.

KEY TO THE SECTIONS

- Filaments broadened, cuspidate at apex.....Section IV. BICUSPIDARIA
 Filaments narrowed, not cuspidate at apex.....
 Seeds horizontal.....Section II. BARTONIA
 Seeds pendulous.
 Placenta broad, plicated.....Section I. EUMENTZELIA
 Placenta narrowly filiform.....Section III. TRACHYPHYTUM

SECTION I. EUMENTZELIA Torrey & Gray

Section I. EUMENTZELIA Torrey & Gray, Fl. N. Am. 1: 533. 1840; Walpers, Rep. 2: 224. 1843; Brewer & Watson, Bot. Calif. 1: 235. 1876; Urban & Gilg in Engl. & Prantl, Nat. Pflanzenfam. 3^{te}: 110. 1894; in Nov. Act. Nat. Cur. [Abh. K. Leop.-Carol. Akad. Naturf.] 76: 41. 1900.

Mostly perennials; the stems, leaves, and capsules hirsute-scabrous with glochidiate and spine-like hairs; leaves sessile or petiolate, serrate-dentate to trilobed; flowers terminal or in the forks of the branches; petals 5, yellow to orange; filaments few to numerous, filiform or the outer 10 slightly broadened or petaloid, all antheriferous; capsule cylindrical to obconical-turbinate, sessile or pedicellate; placentae broad, irregularly plicate-rugose; seeds 1-15, rarely more, in 1 to 2 series, pendulous, striate to densely tuberculate-verrucose, opaque, usually not winged. Spp. 1-20.

KEY TO SPECIES OF SECTION EUMENTZELIA

- A. Leaves alternate.
 B. Calyx-tube and capsule cylindrical, mostly sessile.
 C. Outer stamens petaloid.....19. *M. aspera*
 CC. Outer stamens not petaloid.
 D. Stamens 15 or more.
 E. Perennial; capsule thick-walled, often recurved, few-seeded.....13. *M. oligosperma*
 EE. Annual; capsule thin-walled, straight, several-seeded....18. *M. asperula*
 DD. Stamens 10-1212. *M. parvifolia*
 BB. Calyx-tube and capsule obconical or turbinate, attenuated below into more or less of a pedicel (except in *M. soratensis*).
 C. Stamens equal in size.
 D. Leaves mostly petiolate.
 E. Lower leaves petiolate, upper leaves subsessile.....15. *M. adhaerens*
 EE. Leaves all petiolate.
 F. Capsule sessile or nearly so; petals 7-9 mm. long.....17. *M. texana*

- FF. Capsule strongly pedicellate; petals 10–15 mm. long.
 G. Stamens about 20; pedicel 3 mm. or more long.....16. *M. floridana*
 GG. Stamens about 40; pedicel 1–1.5 mm. long.....14. *M. Lindheimeri*
 H. Calyx-lobes lanceolate, 10–12 mm. long.....10. *M. chilensis*
 HH. Calyx-lobes linear-lanceolate, 7 mm. long.....
 10a. *M. chilensis* var. *atacamensis*
- DD. Leaves sessile.
 CC. Stamens unequal in size.
 D. Leaves sessile.
 E. Leaves deeply incised to subtrilobate.....7. *M. strigosa*
 EE. Leaves ovate to ovate-orbicular, never strongly incised.
 F. Capsule sessile.....11. *M. sessilifolia*
 FF. Capsule pedicellate.
 G. Stamens 40–50, in 2 (rarely 3) series.....9. *M. ignea*
 GG. Stamens 50–60, in 3 series.
 H. Leaves ovate-lanceolate to triangular-lanceolate.....
 5. *M. soratensis*
 HH. Leaves ovate.....6. *M. cordifolia*
- DD. Leaves petiolate (upper leaves subsessile in sp. 8).
 E. Petals 18–20 mm. long.....8. *M. cordobensis*
 EE. Petals 20–32 mm. long.
 F. Petals 20–22 mm. long.....3. *M. Fendleriana*
 FF. Petals 23–32 mm. long.
 G. Stamens 40–80, in 2–3 series.....4. *M. hispida*
 GG. Stamens 100–120, in 4 series.....2. *M. scabra*
- AA. Leaves opposite or subopposite.....1. *M. arborescens*

1. ***M. arborescens*** Urban & Gilg apud Urb. in Ber. Deut. Bot. Ges. 10: 265. 1892; Gilg in Engl. & Prantl, Nat. Pflanzenfam. 3rd: 110. 1894, and ed. 2. 21: 534. 1925; Urban & Gilg in Nov. Act. Nat. Cur. [Abh. K. Leop.-Carol. Deutsch. Akad. Naturf.] 76: 76. 1900.

M. Conzattii Greenm. in Proc. Am. Acad. 32: 298. 1897.

Tall shrub or small tree with brittle woody stems; stems yellowish, covered with a thin scarious bark, glabrous below, pubescent above on younger parts; lower leaves subopposite, upper more often distinctly alternate, simple, oblong-lanceolate, 4–12 cm. long, 1.5–3.5 cm. broad, acuminate, acute, finely dentate, gradually narrowed at the entire base into a short petiole, scabrous above, tomentose beneath, midrib somewhat depressed above, prominent beneath; petioles 4–12 mm. long; inflorescence cymose-paniculate; flowers pedicellate, showy, bright yellow, about 5 cm. in diameter; calyx-tube turbinate, barbellate-pubescent; calyx-lobes 5, lanceolate-ovate, acumi-

nate, 12–15 mm. long, 4 mm. broad at base, pubescent; petals 5, rarely 6, ovate-oblong, short-acuminate, slightly narrowed at base, 2.5 cm. long, 1–1.5 cm. broad; stamens numerous, in 4 series, disposed in phalanges opposite the petals, the 4 outer filaments of each phalanx flattened and broadened over half their length, the remainder of the filaments filiform and about one-half or two-thirds as long as the outer ones; style single, filiform, somewhat attenuated and 6-angled at the summit; capsule broadly ovate, obtuse at base, yellowish-brown, distinctly striate, with persistent calyx-lobes and style, 3-valved at apex; seeds in 1 or 2 series on the placentae, placed horizontally in the centre of the capsule at maturity, winged.

Distribution: mountainous regions in southern Mexico.

Specimens examined:

MEXICO: Oaxaca, mountains near Tlacotalpan, 6000–8000 ft. alt., 7 Dec. 1894, *Nelson 2089* (US); Oaxaca de Juarez, 1550 m. alt., 19 Dec. 1906, *Conzatti* (ANSB, F, M, US, V); Oaxaca, 1550 m. alt., 10 March 1907, *Conzatti 1758* (US); Pueblo Nuevo, Miahuatlan, 2550 m. alt., 1920, *Conzatti 4094* (US); Juquila, Oaxaca, 1400 m. alt., 12 Dec. 1921, *Conzatti 4359* (US); Oaxaca, 1843, *Galeotti 3682* (K, V).

2. *M. scabra* HBK. Nov. Gen. et Sp. 6: 120. 1823; DC. Prodr. 3: 343. 1828; G. Don, Hist. Dichl. Pl. 3: 66. 1834; Dietrich, Syn. Pl. 3: 85. 1843; Urban & Gilg in Nov. Act. Nat. Cur. [Abh. K. Leop.-Carol. Deutsch. Akad. Naturf.] 76: 73. 1900.

Perennial, 4–8 dm. high; stems erect, dark yellow, scabrous with rigid verticillate glochidiate hairs; leaves alternate, ovate, regularly denticulate to crenate, acute, subrotund at the base, upper surface densely covered with short, recurved, tubercular-hispid hairs, dark green, the lower surface densely clothed with short verticillate glochidiate hairs, grayish, lower leaves short but distinctly petiolate, upper usually sessile; flowers sessile in the forks of dichotomous branches; calyx-tube obconical to turbinate, attenuated below, densely covered with long verticillate spine-like hairs; calyx-lobes ovate-oblong to ovate-lanceolate or lanceolate, 13–20 mm. long, persistent in fruit, irregularly reflexed, dark; petals 5, yellow, obovate to broadly obovate, 2–3 cm. long, shortly apiculate, narrowed at the base, dorsal surface with short hairs near the apex, otherwise glabrous; stamens 100–120, in 4 series, the 10 exterior

nearly as long as the petals and broadened, rest filiform or narrowly linear and shorter, more or less coherent at the base; capsule subcylindrical, attenuated below into a pedicel 1.6–1.7 cm. long, grayish, scabrous; seeds 4–6, in 2, rarely 1, series, pendulous, irregularly ovate to ovate-oblong, brown or brownish-black, irregularly striated to densely verrucose-tuberculate, narrowly winged.

Distribution: in mountainous regions of Colombia, Ecuador, and Peru.

Specimens examined:

COLOMBIA: Rio Guaitara, Pasto, 1500–1600 m. alt., Lehmann 7944 (F, K); Rio Guaitara, between Luquerres and Pasto, 16 May 1876, André 3187 (F, K).

3. M. Fendleriana Urban & Gilg in Mem. Torr. Bot. Club 3: 34. 1893.

Perennial; stems erect, white or yellowish-white, scabrous; leaves alternate, lanceolate, regularly dentate or serrate, base subcuneate, apex shortly acuminate; petiole 1.3 cm. long, scabrous, canescent; flowers sessile, disposed in cymes at ends of the branches; calyx-tube obconical or turbinate, attenuated, hirsute; calyx-lobes ovate-lanceolate, 13–14 mm. long, acuminate, pilose, persistent, withered, black, reflexed on the fruit; petals 5, yellow, obovate or obovate-oblong, 2–2.2 cm. long, apiculate, apex pilose; stamens 70–80, in 4 series, the 10 exterior filaments 1.8 cm. long, linear, the inner series filiform and shorter; style filiform, persistent in fruit; capsule obconical or turbinate, attenuated, black, scabrous, shortly pedicellate, pedicel about 1 cm. long; seeds 5–6, pendulous, irregularly ovate-oblong, yellow or grayish-yellow, striate, verrucose-tuberculate.

Distribution: from Venezuela southward along the western coast of South America from Ecuador to Chile.

Specimens examined:

VENEZUELA: near Tovar, 1854–5, Fendler 1876 (ANSP, M).

ECUADOR: near Pillaro, Prov. Tungurahua, without date, Pachano 79 (US).

PERU: without definite date or locality, Wilkes' Exploring Expedition (US); Huanantango, without date, Bordeaux (K); Lima, without date, Cuming 1011 (K); Ollantaytambo, 3000 m. alt., 24 April 1915, Cook & Gilbert 280 (US); same locality, 4 May 1915, Cook & Gilbert 545 (US); Uspachaca, 8500 ft. alt., 23 June 1922,

Macbride & Featherstone 1296 (US); *Tulara*, Prov. Paita, 1925, *Haught* (US); near Urubamba, 3000 m. alt., April 1926, *Herrera* 1066 (US); Urubamba Valley, Gueay, 3000 m. alt., Jan. 1927, *Herrera* 1366 (US); same locality, July 1927, *Herrera* 1529 (US).

BOLIVIA: Bolivian Plateau, 1891, *Bang* 748 (ANSP, K, M, US); same locality, *Bang* 1082 (ANSP, F, M, US); Parotani, 20 March 1892, *Kuntze* (F); Valley of Chillo, 1500 ft. alt., without date, *Hall* 11 (K); Andacollo Valley near Coquimbo, 1000 ft. alt., Sept. 1927, *Elliott* 31 (K).

4. *M. hispida* Willd. Sp. Pl. 2²: 1176. 1799; Juss. Ann. Mus. Nat. Hist. 5: 24. 1804; DC. Prodr. 3: 343. 1828; Urban & Gilg in Nov. Act. Nat. Cur. [Abh. K. Leop.-Carol. Deutsch. Akad. Naturf.] 76: 64. 1900.

M. aspera Lam. Ill. pl. 425. 1797; Cav. Ic. 1: 51, pl. 70. 1791.

M. stipitata Mociño & Sesse, Fl. Mex. ex DC. Prodr. 3: 343. 1828; Presl, Reliq. Haenk. 2: 40. 1835.

M. gracilis Urb. & Gilg, l.c. 61. 1900.

M. Palmeriana Urb. & Gilg, l.c. 75.

M. Karwinskii Urb. & Gilg, l.c. 65.

M. imbricata Urb. & Gilg, l.c. 67.

M. polyantha Urb. & Gilg, l.c. 70.

M. Orizabae Urb. & Gilg, l.c. 60.

M. Galeottii Urb. & Gilg, l.c. 69.

M. incisa Urb. & Gilg, l.c. 59.

Annual or perennial from a fusiform root, 5–8 dm. high, striate, brown or brownish-yellow, densely scabrous, especially on younger branches; stems dichotomously branched; leaves alternate, ovate-lanceolate, broadly serrate-dentate to subtrilobate, acuminate at the apex, rotund at the base, rarely subcordate to subcuneate, shortly petiolate, 4–6 cm. long, upper and lower surfaces densely scabrous; flowers at the apex of branches or in the forks of dichotomous branches, orange-yellow; calyx-tube conical, attenuated, hirsute-scabrous; calyx-lobes ovate-lanceolate to lanceolate, long-acuminate, 12–15 mm. long, persistent, withered in fruit, reflexed, brownish-gray; petals 5, obovate or obovate-oblong, abruptly apiculate, 2–3 cm. long, slightly puberulent at the apex, otherwise glabrous; filaments 40–60, in 2–3 series, the exterior 10 filaments longer, linear, inner series filiform and somewhat shorter; style fili-

form, glabrous, angled, papillose at the apex, withered and persistent in fruit; capsule conical, attenuated, brown or brownish-black, seaceous, subchartaceous; seeds 6–10, pendulous, irregularly ovate to ovate-oblong, brownish-gray, irregularly striate to densely tuberculate-verrucose.

Distribution: Mexico.

Specimens examined:

Mexico: indefinite locality, without date, *Wawra* 304 (V); *Uhde* 1073 (US); Valley of Mexico, *Schenitz* (V); Valley of Mexico, *Schaffner* 160 or 169 (K); indefinite locality, without date, *Orcutt* 4420 (K); Chapultepec, *Knechtel* 757 (V); Pahuán, *Ehrenberg* 202 (US); Orizaba, State of Vera Cruz, *Botteri* 558 (US); same locality, *Botteri* 769 (K); without definite locality, 1839, *Berlandier* 654 (M, V); Aguas Calientes, Zacatecas, 1839, *Hartweg* 16 (K, V); Oaxaca, Nov.–April 1840, *Galeotti* 3683 (V); Tehuacan, Oaxaca, 5000 ft. alt., Aug. 1840, *Galeotti* 3681 (V); Oaxaca, 1842, *Liebmamn* 94 (US); Toluca, 1846, *Heller* (V); Montevideo, 1852, *Hooker* (K); Orizaba, 1853, *Müller* 1088 (V); Valley of Mexico, Mt. Zacoaleo, 5 July–12 Aug. 1865, *Bourgeau* 295 (K, M); Cakoboya, 12 Aug. 1867, *Büimek* 270 (US); indefinite locality, 1868, *Hahn* 29 (M); San Luis Potosí, 1876, *Schaffner* 110 (US); region of San Luis Potosí, 6000–8000 ft. alt., 1878, *Parry & Palmer* 257 (ANSP, M, US); Soledad, 25 miles southwest from Monclova, Coahuila, 9–19 Sept. 1880, *Palmer* 353 (ANSP, US); Caracol Mts., 1880, *Palmer* 357 (US); Saltillo, 1898, *Palmer* 352 (ANSP, C, M, US); Santa Eulalia Mts., Chihuahua, 19 Sept. 1885, *Pringle* 616 (ANSP, F, US); Rio Blanco, State of Jalisco, June–Oct. 1886, *Palmer* 600 (ANSP, US); near Dominguil, 4500–5500 ft. alt., 30 Oct. 1894, *Nelson* 1837 (US); same locality, 3 Oct. 1894, *Nelson* 1592 (US); Durango, April–Nov. 1896, *Palmer* 486 (F, M, US); Puebla, 1900, *Nicolas & Arsène* 35 (F); near Tehuacan, State of Puebla, 1–2 Aug. 1901, *Rose & Hay* 5876 (US); hills near El Salto, Hidalgo, 7500 ft. alt., 15 Sept. 1902, *Pringle* 9802 (F, M, US); near Aguas Calientes, 9 Oct. 1903, *Rose & Painter* 7734 (US); near El Salto, Hidalgo, 16 Sept. 1903, *Rose & Painter* 7071 (US); Ixmiquilpan, Hidalgo, Aug. 1905, *Purpus* (C); between San Pablo and Cuderozta, State of Queretaro, 25 Aug. 1905, *Rose, Painter & Rose* 9831 (US); near Tlalpam, Valley of Mexico, 1905, *Rose, Painter & Rose* 9444 (US); near San Juan del Rio, State of Queretaro, 18 Aug. 1905, *Rose, Painter & Rose* 9595 (US); Del Ciervo a In. Juan, State of Queretaro, 27 Aug. 1905, *Altamirano* (US); Cerro San Antonio, Oaxaca, 1700 m. alt., 28 Oct. 1906, *Conzatti* 1590 (US); same locality, 1600 m. alt., 12 Oct. 1907, *Conzatti* 2035 (F); Morelia, 2000 m. alt., 6 Sept. 1909, *Arsène* 47 (F); Churubusco, 4 Oct. 1910, *Orcutt* 4296 (F, M); Tlalpam, 16 Aug. 1910, *Orcutt* 3622 (F, K, M, US); Minas de San Rafael, San Luis Potosí, Nov. 1910, *Purpus* 4892 (C); Puebla, 1910, *Arsène* 35 (F); Cerro San Miguel, near Morelia, State of Michoacan, 15 Sept. 1910, *Arsène* 5203 (US); near Morelia, State of Michoacan, 1910, *Arsène* 5338 (K, M, US); Rincon, near Morelia, State of Michoacan, 1900 m. alt., 8 Sept. 1910, *Arsène* 5238 (M, US); Acueducto Hercules, Queretaro, 1912, *Arsène* 10609 (US); Buena Vista, State of Tamaulipas, 18 June 1919, *Wooton* (US); Tampa, 9000 m. alt., 8 April 1926, *Bunyon* 997 (US).

5. *M. soratensis* Urban & Gilg in Nov. Act. Nat. Cur. [Abh. K. Leop.-Carol. Deutsch. Akad. Naturf.] 76: 68. 1900.

Perennial; stems erect, brown, terete, striated, scabrous, branching above; leaves alternate, sessile, ovate-lanceolate to triangular-lanceolate, 3–3.5 cm. long, dentate or serrate, scabrous, base rotund, apex short-acuminate; flowers sessile, disposed in cymes at the ends of branches; calyx-tube obconical or turbinate, attenuated but not pedicellate, 4–5 mm. long; calyx-lobes ovate, acuminate, 10–12 mm. long, persistent, withered, black; petals 5, obovate to obovate-oblong, 1.8–2 cm. long, apex pilose, apiculate; stamens 50–60, in about 3 series, the 10 exterior filaments 1.5–1.7 cm. long, linear, the inner series filiform, less than 1 cm. in length; capsule obconical or turbinate, black, scabrous, 1.3–1.5 cm. long, attenuated toward the base into a very short pedicel; seeds 4–6, pendulous, irregularly ovate to ovate-oblong, gray or grayish-yellow, irregularly striate to tuberculate-verrucose.

Distribution: Ecuador, Peru and Bolivia.

Specimens examined:

ECUADOR: vicinity of Huigra, 18 Aug. 1918, Rose & Rose 22198 (US); Huigra, Prov. Chimborazo, 3 Aug. 1920, Holway & Holway 819 (US); same locality, 1200 m. alt., 4–27 July 1923, Hitchcock 40317 (US).

PERU: rocky cliffs, Tiabaya, Dept. Arequipa, 2000 m. alt., 1925, Pennell 13069 (ANSP).

BOLIVIA: Prov. Larecaja, 2650 m. alt., May–Dec. 1857, Mandon 621 (V); Sorata, 17 April 1920, Holway & Holway 540 (US).

6. *M. cordifolia* Dombey ex Urban & Gilg in Nov. Act. Nat. Cur. [Abh. K. Leop.-Carol. Deutsch. Akad. Naturf.] 76: 74. 1900.

Perennial branched spreading shrub with erect brown or yellowish-brown stems, densely covered with verticillate glochidiate and a few spine-like hairs, branches ascending; leaves alternate, sessile, ovate, 3–6 cm. long, dentate to serrate, incised below the middle, acute at the apex, subcordate at the base, upper surface roughened with long barbed spine-like hairs, lower surface densely covered with verticillate glochidiate hairs, scabrous; flowers in forks of branches, orange, closed during the day; calyx-tube cylindrical or subconical, at-

tenuated below into a short pedicel, densely clothed with long antrorse spine-like and verticillate glochidiate hairs; calyx-lobes ovate, lanceolate, long-acuminate, 10 mm. long, persistent on the fruit, dark, irregularly reflexed; petals 5, yellow, obovate, 1-2 cm. long, narrowed at base, apex short-acuminate; stamens about 60, in 3 series, the 10 exterior linear and 1 cm. long, the rest filiform and shorter; capsule subcylindrical, attenuated at base with pedicel 8 mm. long, grayish, scabrous; seeds 4-5, in 1 or 2 series, pendulous.

Distribution: open rocky slopes, on shale and gravel, in Peru and Bolivia.

Specimens examined:

PERU: without definite locality or date of collection, McLean (K); dry plains, Aneo, (probably Matthews) 596 (K); loose soils of steep southern slope, Matucana, 8000 ft. alt., 12 April-3 May 1922, Macbride & Featherstone 130 (US); stony slopes, shale, and gravel, Huanuco, about 7000 ft. alt., 5-8 April 1923, Macbride 3215 (US); open rocky slopes, along Rio Chillon, near Viscas, Dept. Lima, 1800-2000 m. alt., 10-15 June 1925, Pennell 14472 (ANSP, US); open rocky slopes, San Buenaventura, Dept. Lima, 2700-2800 m. alt., 17 June 1925, Pennell 14568 (ANSP).

7. *M. strigosa* HBK. Nov. Gen. & Sp. 6: 120. 1823; DC. Prodr. 3: 343. 1828; Urban & Gilg in Nov. Act. Nat. Cur. [Abh. K. Leop.-Carol. Deutsch. Akad. Naturf.] 76: 55. 1900.

Perennial; stems erect, brown or brownish-gray, terete, striated, scabrous; leaves alternate, sessile, ovate-triangular, 3 cm. long, shortly acuminate, serrate, deeply incised and partially 3-lobed, rotund to subcordate at the base, scabrous, subcanescent on both surfaces; flowers disposed in cymose clusters at the apex of branches; calyx-tube obconical to turbinate, attenuate, 5-6 mm. long, hirsute; calyx-lobes lanceolate to linear-lanceolate, 10-12 mm. long, long-acuminate, pilose, persistent, reflexed in fruit; petals 5, yellow, obovate or obovate-oblong, narrowed toward the base, long-apiculate or acuminate, 2-2.5 cm. long, apex pilose; stamens about 50, in 2 or 3 series, the exterior 10 filaments about 1.6 cm. long, broadened, others filiform and shorter; style filiform, glabrous, angled, persistent in fruit; capsule obconical, attenuated, 1-1.5 cm. long, sessile, brownish-black; seeds 8-10, pendulous, irregu-

larly ovate to ovate-oblong, brownish-yellow, striate, more or less tuberculate-verrucose, not winged.

Distribution: reported from Mexico. Though no authentic material has been available for critical study, *M. strigosa* is apparently a distinct Mexican species and has been retained as such by the writer. It is closely related to *M. soratensis* of South America and to *M. hispida* of Mexico.

8. *M. cordobensis* Urban & Gilg in Rev. Mus. de La Plata 5: 289. 1893; in Nov. Act. Nat. Cur. [Abh. K. Leop.-Carol. Deutsch. Akad. Naturf.] 76: 63. 1900.

M. chilensis Griseb. Abh. Ges. Göttingen [Pl. Lorentz.] 19: 102. 1874.

Perennial; stems erect, 8–10 dm. high, brownish or yellowish-brown, scabrous; leaves alternate, lanceolate to ovate-lanceolate, 7 cm. long, dentate or serrate, scabrous, subcanescent, apex shortly acuminate, base round; lower leaves petiolate, the petioles 4–5 mm. long, upper subsessile; flowers in cymes at apex of branches; calyx-tube obconic to turbinate, attenuated below, 6 mm. long, scabrous; calyx-lobes lanceolate-acuminate, pilose, black, persistent, withered, reflexed in fruit; petals 5, orange, obovate to obovate-ovate, narrowed toward the base, long-acuminate, 1.8–2 cm. long, pilose; stamens 50, in 3 series, the 10 exterior filaments 1.5 cm. long, linear, the inner series filiform and shorter; style filiform, persistent on the fruit; capsule obconical or turbinate; black, scabrous, 1.3–1.5 cm. long, attenuated into a short pedicel; seeds 4–6, pendulous, irregularly ovate to ovate-oblong, brown or brownish-black, irregularly striated, tuberculate-verrucose.

Distribution: in the Province of Cordoba, Argentina.

Specimens examined:

ARGENTINA: Province of Cordoba, without date, Lossen 163 (ANSP, F, M); Cordoba, Dec. 1891, Kuntze (F).

9. *M. ignea* (Phil.) Urban & Gilg in Engl. & Prantl, Nat. Pflanzenfam. 3^{te}: 110. 1894; in Nov. Act. Nat. Cur. [Abh. K. Leop.-Carol. Deutsch. Akad. Naturf.] 76: 58. 1900.

Loasa ignea Phil. Anal. Mus. Nat. Chile, Bot. 1891: 24. 1891.
Perennial; stems erect, branched above, yellow or yellowish-

white, terete, striate, scabrous; leaves alternate, sessile, broadly ovate, 3.5–3.8 cm. long, scabrous, subcanescent, dentate or serrate, incised, base cordate-semiamplexicaul; flowers sessile at the apex of branches; calyx-tube subturbinate or subcylindrical, 5 mm. long, attenuated into a short pedicel, hirsute; calyx-lobes ovate, acuminate, pilose, persistent, withered, yellow, reflexed in fruit; petals 5, orange, obovate, long-apiculate, 1.5–2 cm. long, apex pilose; stamens 40–50, in 2 or 3 series, the 10 exterior filaments longer and more broadened than the inner filiform series; style filiform, persistent, withered in fruit; capsule subturbinate to subcylindrical, black, 1–1.3 cm. long, attenuated into a pedicel; seeds 5–6, pendulous, irregularly ovate to ovate-oblong, brownish-gray or grayish-yellow, irregularly striate to tuberculate-verrucose, not winged.

Distribution: in Chile and Peru.

Specimens examined:

PERU: Arequipa Desert, 21 Aug. 1925, Cockerell (US).

10. *M. chilensis* Gay, Fl. Chile 2: 431. 1846.

Perennial with stems more or less erect, brown or brownish-yellow, striate, scabrous; leaves alternate, sessile, broadly ovate, 2–3.5 cm. long, dentate or crenate, obtuse at the apex, rotund at the base, rarely subamplexicaul-cordate, scabrous on both surfaces, canescent; flowers sessile, in clusters of 1–3 at ends of branches; calyx-tube obconical or turbinate, 12–18 mm. long, attenuated into a pedicel, scabrous; calyx-lobes lanceolate, 10–12 mm. long, long-acuminate, pilose, persistent, withered, blackish, and reflexed on the fruit; petals 5, orange-yellow, obovate, shortly apiculate, 1–1.5 cm. long, apex pilose; stamens 40–50, in 2 or 3 series, filaments linear or filiform, 1 cm. long; style filiform, 1 cm. long, glabrous, angled, persistent on the fruit; capsule obconical or turbinate, base attenuated, pedicellate, black, scabrous, 9 mm. long; seeds 6–8, pendulous, irregularly obovate to ovate-oblong, brown or brownish black, irregularly striate to tuberculate-verrucose, not winged.

Distribution: in Chile and Argentina.

Specimens examined:

ARGENTINA: Puntilla de Villavil, Prov. Catamarca, Feb. 1876, Schickendantz 250 (M photograph).

10a. *M. chilensis* Gay var. *atacamensis* Urban & Gilg in Nov. Act. Nat. Cur. [Abh. K. Leop.-Carol. Deutsch. Akad. Naturf.] 76: 50. 1900.

M. chilensis Phil. Fl. Atac. 19, No. 109. 1860.

Calyx-lobes linear-lanceolate, about 7 mm. long, acuminate; calyx-tube subcylindrical-oblong, attenuated into a pedicel 2-3 mm. long.

Distribution: Atacama Desert, Chile.

Specimens examined:

CHILE: Atacama Desert, without date, Philipp (M photograph, V); Prov. Antofagasta, Taltal, 50 m. alt., Oct. 1925, Werdemann 798 (F, M, US).

11. *M. sessilifolia* Urban & Gilg in Nov. Act. Nat. Cur. [Abh. K. Leop.-Carol. Deutsch. Akad. Naturf.] 76: 57. 1900.

Perennial; stems erect, yellow, striate, scabrous; leaves alternate, sessile, broadly ovate to ovate-orbicular, 3.5 cm. long, denticulate or crenate, acute or obtuse at the apex, subcordate at the base, scabrous, and subcanescent; flowers disposed in cymes at ends of branches; calyx-tube obconical to turbinate, attenuated, 7-8 mm. long, scabrous; calyx-lobes lanceolate, long-acuminate, pilose, persistent, withered, reflexed and black; petals 5, yellow, obovate to obovate-lanceolate, narrowed at the base, apiculate and pilose at the apex, 22-25 mm. long; stamens about 40, in 2 or 3 series, the 10 exterior filaments 1.6 cm. long and somewhat broadened, inner series shorter and filiform; style 1.7 cm. long, persistent and withered on the fruit; capsule obconical to narrowly turbinate, attenuated, sessile, 1.4-1.5 cm. long, black, scabrous; seeds 5-7, pendulous, irregularly ovate to ovate-oblong, gray or grayish-yellow, irregularly striate, densely tuberculate-verrucose, not winged.

Distribution: Mexico.

Specimens examined:

MEXICO: Minas de San Rafael, San Luis Potosi, Nov. 1910, Purpus 4930 (C); Dist. Etla, Oaxaca, 25 Sept. 1920, Consatti 4051 (US).

12. *M. parvifolia* Urban & Gilg in Rev. Mus. de la Plata 5: 289. 1893; in Nov. Act. Nat. Cur. [Abh. K. Leop.-Carol. Deutsch. Akad. Naturf.] 76: 45. 1900.

M. chilensis Griseb. Symb. Argent. 138. 1879. (not *M. chilensis* Gay).

M. Grisebachii Urban & Gilg in Nov. Act. Nat. Cur. [Abh. K. Leop.-Carol. Deutsch. Akad. Naturf.] 76: 48. 1900.

Biennial or perennial herbaceous plants; stems few to several, branching freely, sprawling or spreading, white or yellowish, covered with short verticillate glochidiate hairs; leaves alternate, sessile or nearly so, ovate, 2-4 cm. long, often smaller, dentate to sinuate-dentate, frequently deeply lobed, acute at the apex, cuneate at the base and narrowed into a very short petiole, scabrous to subcanescent, lower surface covered with verticillate glochidiate hairs, upper surface clothed with antrorse spine-like hairs; flowers in forks of the branches, sessile; calyx-tube cylindrical, 5 mm. long, not attenuated below, densely covered with verticillate glochidiate hairs; calyx-lobes ovate-lanceolate, acute or shortly acuminate, 3-4 mm. long, deciduous; petals yellow or orange, obovate-oblong to oblong, 5-7 mm. long, narrowed at base, densely pilose on the dorsal surface near the apex; filaments 10-12, in 1 series, 4-5 mm. long, filiform, linear; capsule cylindrical, sessile, not attenuated at base, obtuse, 7-12 mm. long, brown or brownish-black, always somewhat recurved, striated, crowned with persistent style; seeds 1-4, pendulous, oblique to irregularly rectangular, tuberculate, undulate-striate, brown to brownish-gray, not winged.

Distribution: Bolivia and Argentina.

Specimens examined:

BOLIVIA: Bolivian plateau, collection of 1891, Bang 1005 (ANSP, K, M, US).

ARGENTINA: LaPlaza, Dept. Andalaga, Prov. Catamarca, 2400 m. alt., 9-10 Feb. 1916, Jörgensen 1600 (C, M, US); Cordoba, Dec. 1891, Kuntze (F).

13. *M. oligosperma* Nutt. in Sims, Bot. Mag. 42: pl. 1760. 1815; DC. Prodr. 3: 343. 1828; G. Don, Hist. Dichl. Pl. 3: 65. 1834; Torrey & Gray, Fl. N. Am. 1: 533. 1840; Dietrich, Syn. Pl. 3: 84. 1843; Gray in Mem. Am. Acad. [Pl. Fendl.] 4: 47. 1849; Gray in Boston Jour. Nat. Hist. [Pl. Lindh. pt. 2] 6: 191. 1850; Urban in Nov. Act. Nat. Cur. [Abh. K. Leop.-Carol. Deutsch. Akad. Naturf.] 76: 47. 1900; Small, Fl. Southeast. U. S. 809. 1903; Gray, Man. Bot. ed. 7. 588. 1908; Coulter & Nelson, Man. Bot. Rocky Mts. 324. 1909; Rydb. Fl. Rocky Mts. & Adj. Plains, ed. 2. 574. 1922.

M. aurea Nutt. Gen. 1: 300. 1818.

M. rhombifolia Nutt. ex Torrey & Gray, Fl. N. Am. 1: 533.
1840.

M. petiolata Buckley in Proc. Acad. Sci. Phila. 13: 455. 1861.

M. Nelsonii Greene in Erythea 3: 70. 1895.

M. Diehlii Jones, Contr. West. Bot. 12: 16. 1908.

M. monosperma Wooton & Standley in Contr. U. S. Nat. Herb. [Fl. N. Mex.] 16: 149. 1913.

Perennial herbaceous plants, rough with multi-barbate hairs; stems erect, dichotomously branched, brittle, white or yellowish, cortex becoming loose and papery; leaves alternate, ovate to ovate-lanceolate, 3-7 cm. long, 2-3 cm. broad, sessile, rarely subsessile, irregularly toothed or incised, somewhat lobed and angled, apex acute, base narrowed to cuneate, both surfaces of leaf armed with barbed glochidiate and antrorse spine-like hairs; flowers toward the apex of branches, in 1-3-flowered cymes; calyx-tube narrowly cylindrical, not attenuated, sessile, 5-6 mm. long, terete, densely covered with vorticillate glochidiate hairs; calyx-lobes lanceolate, linear, long-acuminate, 7-9 mm. long, covered with glochidiate hairs, deciduous in mature fruit; petals 5, cuneate-oblong, 8-10 mm. long, cuspidate, entire, somewhat shorter than the stamens, dorsal surface densely covered with short hairs at the apex, otherwise glabrous; stamens about 25, in 2 series, all nearly equal, 7-9 mm. long, filaments linear, filiform; capsule cylindrical, 1-1.5 cm. long, yellowish-green or yellow, scabrous, coriaceous or woody, nearly always curved, striate, sessile; seeds 1-4, pendulous, obovate to obliquely rectangular, irregularly tuberculate, undulate-striate, brown or mottled grayish-brown, not winged.

Distribution: on dry, exposed, gravelly or sandy places, from Texas to Arkansas and west to Wyoming and New Mexico. (One specimen collected by Dr. Leavenworth in "eastern Florida.")

Specimens examined:

FLORIDA: "eastern Florida," Dr. Leavenworth (ANSP, M).

MISSOURI: rocky glades, Jackson Co., 4 Aug. 1864, Broadhead (M); rocky bluffs, Sept. 1869, E. Hall (F); Allenton, 27 Aug. 1878, Letterman (US); St.

Louis Co., 25 June 1879, *Letterman* (F); rocky hills near St. Louis on Meramec River, 27 June 1879, *Eggert* (C, M, US); Allenton, 20 June 1880, *Letterman* (D, F, M); Allenton, June 1882, *Letterman* (F, US); Allenton, 18 July 1883, *Kellogg* (M); Dodson, 26 Aug. 1885, *Bush 238* (M); St. Paul, St. Louis Co., 25 June 1886, *Wisilzenus* 505 (M); rocky hills north of Glencoe, Sept. 1887, *Eggert* (M); Green Co., 22 June 1888, *Blankinship* (US); Glencoe, 25 Sept. 1890, *Glatfelter* (M); southwest Missouri, 1890, *E. Hall* (F); rocky hills near St. Louis, 21 May 1896, *Eggert* (M); limestone cliffs, near Glencoe, May 1897, *Russell* (M); Gasconade, below Big Piney River, 12 Aug. 1897, *Trelease 348* (M); crevices of rock, Dodson, 10 July 1898, *Mackenzie 233* (F, RM); barrens, Noel, 9 Aug. 1908, *E. J. Palmer* (M); barrens, Noel, 9 Aug. 1908, *Bush 5034* (M); exposed limestone bluffs on Grove Creek, Jasper Co., 22 June 1909, *E. J. Palmer 2356* (M); dry cliffs, Scotland, 27 June 1909, *E. J. Palmer 2356* (M); barrens, Purcell, 11 Aug. 1907, *E. J. Palmer 1099* (M); on mine dumps near Mo. Pac. depot, Carthage, 17 July 1910, *E. J. Palmer 3004* (M); limestone ledges, vicinity of Gates, Greene Co., 26 Aug. 1912, *Standley 9400* (US); Jerome, 10 July 1912, *Kellogg* (M); dry limestone ledges, Careytown, Jasper Co., 8 June 1913, *E. J. Palmer 3986* (M); by railroad, near Glencoe, 13 July 1918, *Greenman 3836* (M).

ARKANSAS: White River near Eureka, 18 July 1898, *Glatfelter* (M); dry rocky hillsides, Norfolk, Baxter Co., 20 June 1914, *E. J. Palmer 6043* (M); exposed limestone ledges, Beaver, Carroll Co., 22 June 1914, *E. J. Palmer 6327* (M).

SOUTH DAKOTA: Hot Springs, without date, *MacElwee* (ANSP); Elk Creek Canyon, Black Hills, 14 Aug. 1908, *Visher* (F); Rapid City, 6 Aug. 1908, *Visher 1293* (F); dry clay bank, Erskine, Hot Springs, 22 July 1924, *McIntosh 504* (RM); East Park Gate, Grace Coolidge Creek, Black Hills, 24 July 1929, *Lee* (RM).

KANSAS: Junction City, without date, *Moyer* (US); Lawrence, Sept., without date, *Stevens* (US); Pawnee Rock, western prairies, Sept. 1848, *Gordon* (M); Miami Co., Aug. 1883, *Oyster* (M); Manhattan, Riley Co., 7 July 1884, *Kellerman* (US); prairies and naked clay bluffs, Caldwell, 10 Sept. 1890, *Smyth 272* (US); Manhattan, 30 Aug. 1892, *Norton* (M, US); Phillipsburg, 5 Aug. 1892, *Harshbarger* (F); Manhattan, Sept. 1893, *Norton* (M); gravelly places, near Osborne City, 2 June 1894, *Shear 67* (US); stony hills, Riley Co., 29 June 1895, *Norton 174* (M, RM, US); Riley Co., July 1897, *Pond* (P); Cowley Co., July 1898, *White* (M); limestone hillsides, 12 miles north of Scott City, 16 July 1929, *Rydberg & Imler 1086* (M).

OKLAHOMA: without locality, 8 July 1872, *Hall* (US); Limestone Gap, 20 July 1877, *Butler* (F, M); without locality, June 1877, *Butler 14* (M); Limestone Gap, 1877, *Butler 57* (M); Caddo, 20 June 1891, *Sheldon 231* (US); Cherokee Outlet, 8 June 1891, *Carleton 216* (US); near Tucker, July 1893, *Brown* (ANSP); Woods Co., 29 June 1900, *White* (RM); Mountain Park, 17 July 1903, *Duncan 57* (M); dry calcareous banks, Marietta, Love Co., 10 July 1916, *E. J. Palmer 10417* (D, M); Davis, 19 June 1916, *Emig 610* (M); vicinity of Fort Sill, 22 June 1916, *Mrs. J. Clemens 11694* (M); Fort Sill, 1 June 1916, *Mrs. J. Clemens 11694* (RM); Arbuckle Mts., near Davis, 23 June 1917, *Emig 828* (M); sandy rocky soil on river bank, 1 mile northwest of Ripley, Payne Co., 25 July 1927, *Stratton 232* (M); rocky clay soil, 3 miles south of Hitchcock, Blaine Co., 26 Aug. 1927, *Stratton 476* (M).

TEXAS: without definite locality, *Drummond 49* (V); Bexar Co., without date, *Jermy* (M); Gill Co., without date, *Jermy* (US); Enchanted Rock, Gillespie Co.,

without date, *Jermy* 164 (M, US); Shackelford Co., without date, *Holstein* (ANSP); without definite locality, collection of 1835, *Drummond* 90 (300) (V); 15 July 1845, *Fremont's Expedition* 123 (M); Guadalupe, July-Aug. 1846, *Lindheimer* 396 (ANSP, C, M, US, V); Cibola, near Guadalupe, May 1846, *Lindheimer* 143 (M); Comanche Spring, near New Braunfels, June 1849, *Lindheimer* 816 (F, M, US); Mexican Boundary Survey, northwestern Texas, 1852, *Parry* (M); Fort Smith to the Rio Grande, 31 Aug. 1853, *Bigelow* (US); dry uplands, Dallas, June 1879, *Reverchon* 323 (M, US); Navarro Co., 22 May 1880, *Joor* (M); Linn Co., Aug. 1883, *Oyster* 2800 (CAS); without locality, 1887, *Nealley* (US); Colorado, 8 June 1890, *Eggert* (M); without locality, 1890, *Nealley* (US); without locality, 1892, *Nealley* 122 (US); Dallas, 15 June 1898, *Glatfelter* (M); Turtle Creek, Kerr Co., 2 May 1899, *Bray* 223 (US); stony hills, West Dallas, 23 June 1899, *Eggert* (M); common on hills, Dallas, 29 Sept. 1900, *Bush* 1178 (M); Canyon, 13 Aug. 1900, *Eggert* (M); San Antonio, common in barrens, 20 Sept. 1901, *Bush* 859 (M); Weatherford, 30 May 1902, *Tracy* 8047 (F, M, US, V); Bexar Co., 1903, *Jermy* (M); on limestone hills near Bracken, Bexar Co., 29 June 1903, *Groth* 21 (F, US); Coombs Branch, 25 July 1903, *Reverchon* 323 (M); Waco, 16 Sept. 1905, *Pace* 30 (M); Leon Springs, Bexar Co., 29 May 1911, *Clemens & Clemens* 542 (M, P); San Antonio, Bexar Co., 20 June 1911, *Clemens & Clemens* 541 (P, RM); dry ground, Chisos Mts., 14 Aug. 1915, *Young* (M); dry limestone bluffs, San Saba Co., 4 May 1917, *E. J. Palmer* 11800 (M); sandy uplands, open woods, Clyde, Callahan Co., 26 May 1918, *E. J. Palmer* 13697 (M); dry rocky banks of canyon, Gamble's Ranch, Armstrong Co., 6 June 1918, *E. J. Palmer* 13988 (M); dry exposed ledges, limestone bluffs, Strawn, Palo Pinto Co., 26 June 1918, *E. J. Palmer* 14249 (M); flats along ocean, North Beach, Corpus Christi, Nueces Co., 7 Aug. 1921, *Ferris & Duncan* 3229 (CAS, D, M); Dunham's Island, 6 Sept. 1922, *Tharp* 1580 (US); Pumpville, 1500 ft. alt., 19 July 1922, *Fisher* 295 (US); rocky ground along Limia Creek, near Ft. Davis, Jeff Davis Co., 17 June 1926, *E. J. Palmer* 31003 (M); rocky hillsides, Goliod, April 1927, *Williams* 83 (ANSP); north of Del Rio, 17 April 1930, *Jones* 25661 (M).

COLORADO: Cañon City, 1872, *T. S. Brandegee* B377 (C, M); Cañon City, 1873, *T. S. Brandegee* (ANSP); Cañon City, June 1877, *T. S. Brandegee* (F); foothills, Larimer Co., 6000 ft. alt., 20 July 1895, *Cowen* (C, M, RM); near foothills, west of Loveland, 23 Aug. 1905, *Osterhout* 3154 (RM).

14. *M. Lindheimeri* Urban & Gilg in Nov. Act. Nat. Cur. [Abh. K. Leop.-Carol. Deutsch. Akad. Naturf.] 76: 54-55. 1900.

Annual, 5-6 dm. high; stems solitary, dichotomously branched toward apex, erect, striated, yellow or yellowish-white, densely scabrous; leaves alternate, bright green, ovate, 6-7 cm. long, dentate or crenate to more or less deeply incised to 3-lobed—the middle lobe large, acute or shortly acuminate at the apex—upper surface and margins scabrous with spine-like hairs, lower surface clothed with glochidiate hairs; flowers at

apex of branches or borne in forks of dichotomous branches, yellow to orange; calyx-tube conical, attenuated below into the pedicel, often slightly reflexed, hirsute-scabrous, canescent; calyx-lobes, lanceolate or ovate-lanceolate, 5–10 mm. long, acuminate, scabrous, variously curved and reflexed, frequently persistent on the fruit, dark green; petals 5, obovate, 1–1.5 cm. long, shortly apiculate, pilose at the apex, otherwise glabrous; stamens 40–45, in 2 series, filaments narrowly linear, 7–9 mm. long; style 1 mm. long, filiform, angled, papillose at the apex, persistent in fruit; capsule obconical to subcylindrical, brownish-gray, scabrous, irregularly plicate, rugose; seeds about 10, pendulous, irregularly ovate to ovate-oblong, grayish-yellow, densely tuberculate-verrucose, not winged.

Distribution: dry, sandy or limestone habitats, Texas southward into Mexico.

Specimens examined:

TEXAS: Comal Co., without date, *Mattiess* 392 (V); indefinite locality, *Wright* (P); indefinite locality, Aug. 1845, *Lindheimer* 396 (M, V); indefinite locality, May-Oct. 1849, *Wright* 210 (US); western Texas, 1851, *Parry* (ANSP); Llano Co., 1861, *Buckley* (ANSP); western Texas, 1883, *Havard* (US); Uvalde Co., June 1885, *Reverchon* 1650 (M, US); Limpia Cañon, 1889, *Nealley* 680 (US); Corpus Christi, Nueces Co., 28–31 May 1894, *Heller* 1791 (ANSP, C, P, US); shady rocks, Devil's River, Val Verde Co., 11 Sept. 1900, *Eggert* (M); Corpus Christi, May 1913, *Oroott* 5940 (M); vicinity of Corpus Christi, Oct. 1913, *Rose* 18081 (US); shaded limestone cliffs, Conean, Uvalde Co., 14 June 1916, E. J. Palmer 10205 (M); Pleasanton, Atascosa Co., 23 Sept. 1916, E. J. Palmer 10786 (M); Nabbs Ranch, Palm Grove, Nov. 1923, *Eunyon* 583 (US).

MEXICO: Cerro de Berrego, Oaxaca, without date, *Mohr* 144 (US); Walnut Grove, Monterey, 26 May 1847, *Gregg* 782 (M); Cochuto, Sonora, 5100 ft. alt., 4 Oct. 1890, *Hartman* 93 (US); Oaxaca Valley, State of Oaxaca, 5000 ft. alt., 23 Oct. 1894, *Smith* 827 (M, US); San Luis Potosi and vicinity, July-Aug. 1898, *Palmer* 648 (US); Tehuantepec, July 1900, *Gonzales* (V); Oaxaca, 1750 m. alt., July-Aug. 1900, *Consatti & Gonzalez* 19 (M, US); near Tehuacan, Puebla, 30 Aug.-8 Sept. 1905, *Rose*, *Painter & Rose* 10017 (M); Santa Ana, Oaxaca, 1700 m. alt., 19–23 June 1906, *Consatti* 1458 (US); vicinity of Victoria, Tamaulipas, 320 m. alt., May–June 1907, *Palmer* 404 (F, M, US); Cerro San Antonio, Oaxaca, 18 Aug. 1907, *Consatti* 1985 (F); Tlaxcoala, 2200 m. alt., 20 July 1910, *Arsène & Nicolas* 5891 (K, M, US); Telmacan, 7 Sept. 1919, *Reko* 4228 (US); Cerro de los Armadillos, vicinity of San Jose, 9 July 1930, *Bartlett* 10188 (MH).

15. *M. adhaerens* Benth. Bot. Voy. Sulph. 15. 1844; Walp. Rep. 5: 776. 1845-46; Urban & Gilg in Nov. Act. Nat. Cur.

[Abh. K. Leop.-Carol. Deutsch. Akad. Naturf.] 76: 51. 1900;
Johnston in Proc. Cal. Acad. Sci. IV. 12: 1103. 1924.

Annual or biennial plants, from a slight tap-root, extremely scabrous or hispid throughout, .7-7 dm. high; stems mostly slender, flexuous, trichotomously branched near the base, dichotomously branched above, white or ochroleucous, epidermis scarious, scaling on mature plants, scabrous with glochidiate hairs below, more densely hispid with glochidiate and spine-like hairs above; leaves alternate, thin, round-ovate, 2-8 cm. long, 1-5 cm. broad, coarsely dentate to sinuate-lobate, more or less incised, irregularly 3-5-lobed, acute at the apex, cuneate at base, hispid with short glochidiate hairs on under surface, especially along the veins, upper surface armed with a few spine-like or anchor-like hairs; lower leaves petiolate, petioles 1-6 mm. long, upper leaves subsessile; flowers borne singly in axils of dichotomous branches, subtended by small leafy scabrous roundish bracts, sessile or very short-pedicelled; calyx-lobes 5, dark green, acute or acuminate at apex, nearly equaling the petals in length, dorsal surface covered with long spine-like hairs interspersed with short stiff glochidiate hairs; calyx-tube obconical to turbinate, attenuated at base, pedicelled, hispid with long slender spine-like and glochidiate hairs, 5-7 cm. long; calyx-lobes reflexed or straight, persistent, rugose, tuberculate, covered with long spine-like and anchor-like hairs; petals 5, pale to golden-yellow, obovate to oblong-obovate, spreading, 1-1.5 cm. long, .5-1.0 cm. broad, gradually narrowed toward the base, apex short-apiculate and somewhat pilose; stamens 30-40, in 2 series, filaments narrowly linear to filiform, 7-8 mm. long, anthers oblong; style filiform, 3-parted, stigmatic lobes densely papillose, persistent and withered in fruit; mature capsule obconical to turbinate, brownish-yellow, pedicellate; seeds 10-13, in 1 or 2 series, pendulous, ovate to round-ovate, mottled yellow, irregularly striate and tuberculate-verrucose, not winged.

Distribution: in sheltered places, common on rocky or gravelly situations, in Lower California and on islands in the Gulf of California.

Specimens examined:

LOWER CALIFORNIA: Cedros Island, 1876, *Street* (US); Los Angeles Bay, Island of San Pedro Martir, 1887, *Ed. Palmer* 402 (US); Carmen Island, 1-7 Nov. 1890, *Ed. Palmer* 831 (US); La Paz, 20 Jan.-5 Feb. 1890, *Ed. Palmer* 57 (US); Santa Agueda, 4-6 March 1890, *Ed. Palmer* 254 (US); Cedros Island, March-June 1897, *Anthony* 300 (M, D, US); Calmabia, washes, 1400 ft. alt., Jan.-March 1898, *Purpus* 62 (RM); Espiritu Santo Island, 50-100 ft. alt., 7 Feb. 1906, *Nelson & Goldman* 7508 (US); frequent over higher parts of San Pedro Martir Island, 18 April 1921, *Johnston* 3156 (CAS, US); sandy draw, San Luis Gonzales Bay, 29 April 1921, *Johnston* 3337 (CAS, US); uncommon on lava slopes, Tortuga Island, 11 May 1921, *Johnston* 3604 (CAS); rocky ground at foot of bluff, Coyote Bay, 18 June 1921, *Johnston* 4171 (CAS); sandy wash, 3 miles north of Willard's Point, 3 July 1921, *Johnston* 4257 (CAS); La Paz, Feb. 9 and 25, 1928, *Jones* 24307 (CAS, M, P); Todos Santos, on the north, 17 Feb. 1928, *Jones* 24308 (CAS, M, P).

16. *M. floridana* Nutt. ex Torrey & Gray, Fl. N. Am. 1: 533. 1840; Walp. Rep. 2: 223. 1843; Dietrich, Syn. Pl. 3: 85. 1843; Chapman, Fl. Southeast. U. S. ed. 3, 167. 1897; Small, Fl. Southeast. U. S. 809. 1903, and ed. 2, 810. 1913; Urban & Gilg in Nov. Act. Nat. Cur. [Abh. K. Leop.-Carol. Deutsch. Akad. Naturf.] 76: 53. 1900; Small in Addisonia 4: 13, pl. 127. 1919.

Annual or perennial herbaceous plants, 2-10 dm. high; stems repeatedly dichotomously branched, reclining or occasionally erect, flexuous, slender, densely clothed with minute glochidiate-hispid hairs; leaves alternate, irregularly and rather distantly disposed on the stem, dull green, rotund-ovate to triangular-ovate, hastate, 2-7 cm. long, 1.5-5 cm. broad, coarsely toothed or lobed, acute or shortly acuminate at the apex, rotund or cuneate to subcordate at the base, narrowing abruptly into a dark green petiole 0.5-2 cm. long, impressed-veined and scabrous with spine-like hairs above, prominently veined and with more numerous glochidiate hairs beneath, especially along the veins; flowers near the apex, axillary, sessile; calyx-tube obconical, attenuate but not pedicellate below, about 8-15 cm. long, 3-5 cm. broad, densely covered with long unequal glochidiate hairs, intermixed rarely with spine-like hairs; calyx-lobes 5, imbricated, ovate-oblong, acuminate, lanceolate, 6-8 mm. long, 2.5-3 mm. broad at base, short-acuminate to acute at the apex, persistent, erect, becoming almost black at maturity; petals 5, imbricated, obovate, broadly cuneate to orbicu-

lanceolate, 1–1.5 cm. long, 0.8–0.9 cm. broad, concave, usually abruptly short-apiculate at the apex, gradually narrowed below, pilose near the apex, otherwise glabrous; stamens 30–35, in 2 series, filaments narrowly linear, 7–8 mm. long, anthers all equal, oblong or oval-oblong, laterally dehiscent; style 6 mm. long, filiform, glabrous, narrowed, 3 stigmatic surfaces with papillose margins near the apex, persistent in the fruit; capsule oboconical, papery, attenuated into a pedicel 3–4 mm. long when young, at maturity 1.5–1.8 cm. in length; seeds 8–10, in 1 or 2 series, pendulous, irregularly ovate to ovate-oblong, yellowish mottled with brown, irregularly striate to densely tuberculate-verrucose, 2.5 mm. long, 1.8 mm. broad, not winged.

Distribution: in hammocks and clearings, Florida and the Bahama Islands.

Specimens examined:

FLORIDA: southern Florida, various collections without date, Chapman (ANSP, F, M, US); without definite locality or date, Calkins (US), and Peale (ANSP TYPE); Miami, without date, Garber (ANSP); Lake City, without date or collector's name, Hitchcock Herb. 1366 (F); Manatee, southwestern Florida, July 1845, Egel 252 (V); Indian River, 1874, Palmer 181 (F, M, US); Cedar Keys, April 1876, Garber (F, US); Miami, April 1877, Garber (ANSP, F, US); shell islands at the mouth of St. John's River, Oct. 1878, Curtis 659 (ANSP, US), and Curtis 959 (CAS, F, M, US); on shell mounds, Manatee Co., 20 March 1887, Rothrock (ANSP, F, M); without definite locality, collection of 1889, Simpson (US); Lake Worth, 1 Feb. 1892, Meehan (ANSP); Palm Beach, 29 March 1895, Canby (US); hammocks, Palm Beach, 27 Dec. 1895, Webber 255 (F, M); Palm Beach, 26 Dec. 1895–11 Jan. 1896, Hitchcock 674, 675, 676, 677 (F); rich calcareous land, Miami, 28 March 1897, Curtis 5842 (F, M, US); Fort George, Duval Co., Oct. 1897, Light-hipe 8431 (RM); Rockledge, 12–14 April 1897, Crawford (ANSP); Sneed's Island, 28 April 1900, Tracy 6818 (F, M, US, V); Marco, July–Aug. 1900, Hitchcock (F); Fisherman's Key, 15 May 1901, Tracy 7469 (F, M, US); sea-shore thicket, Brevard Co., 27 Oct. 1902, Fredholm 5500 (RM, US); in hammocks, Miami, Nov. 1903, Small & Carter 676 (ANSP, F); Miami, 18 March 1904, Britton 9 (F); in hammocks, near Palm Beach, 19 Nov. 1904, Small (ANSP); east coast, 10 April 1904, Burgess 778 (F); vicinity of Palm Beach, 15 Feb.–15 March 1908, Garvens (F); Knight's Key, 28–29 Jan. 1909, Small & Carter 286 (ANSP); Captiva, Lee Co., 15 March 1915, Orrok (US); vicinity of Marco, Lee Co., 25 Feb. 1916, Standley 12787 (US); dry thicket, Rockledge, Brevard Co., 8–18 March 1916, Bartram (ANSP); waste ground, Miami, 8 March 1917, Meredith (ANSP); coastal sand dunes, Lauderdale Beach, Brevard Co., 17 Dec. 1929, Moldenke 256 (M).

BAHAMA ISLANDS: in sandy soil, Governor's Harbor, Eleuthera, 19–20 Feb. 1907, Britton & Millspaugh 5516 (F).

17. *M. texana* Urban & Gilg, Nov. Act. Nat. Cur. [Abh. K. Leop.-Carol. Deutsch. Akad. Naturf.] 76: 52-53. 1900.

Annual or biennial, 5-6 dm. high; stems solitary, erect, striate, yellow or brownish-yellow, scabrous, canescent; leaves alternate, ovate or ovate-triangular, 2-4 cm. long, remotely dentate, deeply incised to somewhat trilobed, acute at the apex, rotund at the base, shortly petiolate, upper and lower surface hirsute-scabrous, subcanescent; flowers at apex of branches, sessile; calyx-tube conical, attenuated, densely hirsute-scabrous; calyx-lobes lanceolate, acute or shortly acuminate at the apex, usually persistent on the fruit, almost black; petals 5, yellow, obovate, 7-9 mm. long, shortly apiculate, narrowed toward the base, apex pilose; stamens 20-25, in 1 series, all filiform or nearly linear; style persistent and withered on the fruit; capsule conical or subcylindrical, attenuated into a short pedicel or subsessile, 1.4 cm. long, brown, scabrous; seeds 7-8, pendulous, irregularly ovate to ovate-oblong, grayish-brown, striate, densely tuberculate-verrucose.

Distribution: southern Texas and Mexico.

Specimens examined:

TEXAS: indefinite locality, 1855, *Drummond 202* (V).

MEXICO: vicinity of Puebla, 2190 m. alt., 4 Oct. 1906, *Arsène 470* (M, US); Cerro Guadalupe, vicinity of Puebla, 2250 m. alt., 7 Nov. 1908, *Arsène 1863* (M, US); Rancho Posadas, Puebla, 1909, *Nicolás* (K).

18. *M. asperula* Wooton & Standley in Contr. U. S. Nat. Herb. 16: 148-149. 1913.

Annual herbaceous plants with erect branching stems, 3-5 dm. high, scabrous at first, later becoming more or less smooth below; upper branches strongly ascending, lower branches divergent and then erect; leaves narrowly ovate to lanceolate, 3-5 cm. long, coarsely and irregularly serrate-dentate, frequently laciniately 2-4-lobed near the base, hispid on the upper surface with verticillate spine-like and glochidiate hairs, the under surface densely covered with minute and longer glochidiate hairs, especially along the prominent veins, attenuated into petioles 8-10 mm. long; flowers terminal, axillary, sessile, white or yellow; calyx-tube terete, short-clavate,

elongating in fruit, densely hispid with barbed glochidiate hairs; calyx-lobes 5, narrowly lanceolate, 3–5 mm. long, acuminate at first, becoming subulate, more or less persistent until the fruit is mature; petals 5, ovate to obovate, 6–8 mm. long, short-apiculate, orange, early deciduous; filaments shorter than the petals, filiform, none dilated, 10–15 in number, anthers light yellow; fruit cylindric to long-clavate, 18–25 mm. long; seeds usually 8, pyriform to suborbicular or subrectangular, obscurely and bluntly angled, mottled grayish-brown, with parallel curved striae.

Distribution: shaded ravines, dry slopes, limestone hills in the mountainous regions of western Texas, New Mexico, Arizona and northern Mexico.

Specimens examined:

TEXAS: Limpia Canyon, 1889, Nealley 659 (US); Valley of the Rio Grande, below Donna, Parry, Bigelow, Wright, Shott 387 (US).

NEW MEXICO: Trujillo Creek, Sierra Co., 14 Sept. 1904, Metcalfe 1364 (CAS, F, M, P, US TYPE); Van Patten's Ranch, Organ Mts., Dona Ana Co., 10 Sept. 1899, Wooton (US); Mogollon Mts., Catron Co., Sept. 1880, Greene (P); shady ravines, Burro Mts., 12 Oct. 1881, Eusby 139 (ANSO, F, M); without definite locality, 1851, Wright 1081 (ANSO, US).

ARIZONA: Davidson's Canyon, 10 Sept. 1884, Pringle (F, US); Paradise, Slope 1, 5500 ft. alt., 19 Sept. 1907, Blumer 1669 (F, M, US, V); Bowie, 20 Sept. 1884, Jones 4308 (CAS, F, P, RM, US); Santa Rita Valley, 6000 ft. alt., Aug. 1874, Rothrock 642 (F, US); Santa Rita Mts., 4500 ft. alt., 24 Aug. 1903, Jones (P); Santa Rita Mts., 26 Sept. 1880, Engelm. (M); Nogales, 28 Aug. 1927, Peebles, Harrison & Kearney 4668 (US); Huachuca Mts., 5500 ft. alt., 3 Sept. 1903, Jones (P); near Fort Huachuca, Sept. 1894, Wilcox 431 (US); Baboquivari Canyon, 11 Oct. 1925, Peebles, Harrison & Kearney 397 (US); Baboquivari Mts., 25 Sept. 1927, Harrison 4765 (US); Baboquivari Mts., 19 Sept. 1929, Jones 24963 (M).

MEXICO: Soledad, Nuevo Leon, Feb.–Oct. 1880, Palmer 351 (US); rocky hills near Chihuahua, 12 Sept. 1885, Pringle 633 (ANSO, F, US); rocky hills near Chihuahua, 12 Nov. 1885, Pringle (V); hills near Chihuahua, 8 Oct. 1886, Pringle 1077 (M); Durango and vicinity, April–Nov. 1896, Palmer 484 (F, M, US).

19. *M. aspera* Linn. Sp. Pl. ed. 1. 516. 1753; *Amoen. Acad.* 5: 398. 1760; Willd. Sp. Pl. 2²: 1175. 1799; Juss. in *Ann. Mus. Nat. Hist.* 5: 18. 1804; Ait. f. *Hort. Kew.* 3: 302. 1811; Lunan, *Hort. Jam.* 1: 504. 1814; Spreng. *Syst. 2*: 601. 1825; DC. *Prodr.* 3: 343. 1828; Dietrich, *Syn. Pl.* 3: 85. 1843; Anderss. *Galap. Veg.* 222. 1854; Griseb. *Fl. Brit. West Indies*, 298. 1861; Gray in *Proc. Am. Acad.* 5: 158, 180. 1862; Brewer & Watson, *Bot. Calif.* 1: 235. 1876; Urb. *Symb. Antill.* 8: 457.

1920-21; Fawcett & Rendle, Fl. Jam. 5: 248. 1926; Small in Addisonia 15: 47, pl. 504. 1930.

M. stipitata Presl, Reliq. Haenk. 2: 40. 1835; Walp. Rep. 2: 224. 1843.

M. pedicellata Presl, Epim. Bot. 246. 1849.

M. albicaulis Torrey, Bot. Mex. Bound. Surv. 67. 1859, p.p. (ex Wats.).

Acrolasia squalida Hook. f. in Trans. Linn. Soc. Lond. 20: 222. 1851.

Annual herbaceous plants, generally straggling, sometimes erect; stems brownish-green, yellow, or nearly white, terete and longitudinally striate, covered with short verticillate glochidiate hairs intermixed with antrorse spine-like hairs, sparingly toward the base, more dense on the younger parts of plant; leaves alternate, lanceolate or ovate-lanceolate, widely ovate or triangular-ovate, 10-15 cm. long, 8 cm. broad, acute or short-acuminate at the apex, serrate or serrate-dentate or deeply incised in the middle part to almost three-lobed, base cuneate or abruptly narrowed into a petiole 2-5 mm. long, or subcordate to cordate, upper surface of leaves dark green, covered sparingly with long slender antrorse spine-like hairs, lower surface lighter green and densely covered with minute verticillate glochidiate hairs intermixed with longer ones; flowers sessile, axillary; calyx-tube terete, cylindrical, attenuated at the base, 6-11 mm. long, 2-3.5 mm. wide, covered with stiff verticillate glochidiate hairs; calyx-lobes 5, imbricated, lanceolate to linear-lanceolate, long-acuminate, 3-4 mm. long, 1-1.5 mm. wide, covered with long antrorse spine-like hairs, not persistent in the mature fruit; petals 5, obovate or oblong-obovate to obovate-orbicular, narrowed toward base, acute, 4-8 mm. long, 2.5-4 mm. wide, glabrous or hispid on the dorsal surface toward the apex; filaments 20-30, 1-2 series, exterior series always dilated and petaloid, spatulate, all fertile; anthers oblong or oval-oblong, laterally dehiscent; style filiform, 3-parted at apex, contorted, stigmatic surfaces papillose, sometimes persistent in fruit; capsule cylindrical or subcylindrical, 15-25 mm. long, 3-5 mm. wide, terete, inconspicuously striate, sessile, obtuse at the base, brownish-green, turning

brown, scabrous, papery, 3-valved, with alternate placentae; seeds 6–9, pendulous, irregularly ovate-oblong or oblong to subrectangular, 2.5–3.5 mm. long, 1.5 mm. broad, mottled grayish-yellow, irregularly tuberculate, minutely but strongly undulate-striate, not winged.

Distribution: southern Arizona, southward to Brazil, Bolivia, the Galapagos Islands and the West Indies.

Specimens examined:

ARIZONA: Nogales, 28 Aug. 1927, Peebles & Harrison 4730 (US).

MEXICO: CHIHUAHUA—southwestern Chihuahua, Aug.-Nov. 1885, Ed. Palmer 101 (ANSP, US); Guayanopa Canyon, Sierra Madre Mts., 3600 ft. alt., 24 Sept. 1903, Jones (P); near Chuichupa in the Sierra Madres, 4 Sept. 1899, Townsend & Barber 407 (F, M, US); Sierra Madre, 6 Sept. 1899, Barber & Townsend (US); DURANGO—City of Durango and vicinity, April-Nov. 1896, Ed. Palmer 484 (F); ZACATECAS—near San Juan Capistrano, 21 Aug. 1897, Rose 2457 (US); SONORA—Hermosillo, 29 Oct. 1926, Jones 22339 (P); LOWER CALIFORNIA—Cape St. Lucas, Aug. 1859-Jan. 1860, Xantus 3b (US); San Jose del Cabo, 23 Sept. 1890, T. S. Brandegee 224 (ANSP, US); El Tasté, 12 Sept. 1893, T. S. Brandegee (P); SINALOA—State of Sinaloa, 1922, Ortega 4773 (US); Hacienda Labradas, vicinity of Labradas, 25 Sept. 1925, Ferris & Mexia 5282 (CAS); NAYARIT—Maria Madre, Tres Marias Islands, 23 Oct. 1925, Ferris 5660 (D, US); JALISCO—near Etzatlan, 2 Oct. 1903, Rose & Painter 7549 (US); Bolanos, 10–19 Sept. 1897, Rose 2896 (US); COLIMA—Colima, 20 Oct. 1910, Orcutt 4531 (D, F, M); Colima, 24 Oct. 1910, Orcutt 4534 (K); MICHOACAN AND GUERRERO—La Morena, 400 m. alt., 7 Dec. 1898, Lang-lasse 704 (K, US); VERA CRUZ—Wartenburg, near Tantoyuca, Prov. Huasteca, 1858, Ervendberg 206 (ANSP); OAXACA—vicinity of Cuicatlán, 1890–2500 ft. alt., 8–24 Oct. 1894, Nelson 1661 (US); YUCATAN—Merida, 25 Nov. 1864, Schott 41 (US); Merida, 10 Oct. 1865, Schott 861 (M, US); Izamal, without date, Gowamer 821 (CAS, D, F).

CENTRAL AMERICA: GUATEMALA—St. Thomas, 1841, Friedrichsthal 378 (V); vicinity of Zacapa, Dept. Zacapa, 200–400 m. alt., Dec. 1906, Pittier 1761 (US); PANAMA—low swampy ground, between Corozal and Ancon, Canal Zone, 10–30 m. alt., 3 Jan. 1911, Pittier 2209 (US); around Gamboa, Canal Zone, 20–100 m. alt., Nov. 1911, Pittier 4793 (US); Balboa Heights, 12 Jan. 1922, Greenman & Greenman 5055 (M); Ancon Hill, Panama Canal Zone, 13 Jan. 1922, Greenman & Greenman 5114 (M); brushy slopes, Sosa Hill, Balboa, Canal Zone, 27 Nov.–10 Dec. 1923, Standley 25256 (US); coastal thicket, Bella Vista, 28 Nov. 1923, Standley 25350 (US); open grassy slope, Ancon Hill, Canal Zone, 26 Nov.–9 Dec. 1923, Standley 26360 (US); brushy slope, Gamboa, Canal Zone, 26 Dec. 1923, Standley 28333 (US); near beach, Balboa, Canal Zone, Nov. 1923–Jan. 1924, Standley 32150 (US); open bank, Darien Station, Canal Zone, 19 Jan. 1924, Standley 31521 (US).

WEST INDIES: HAITI—vicinity of Port au Prince, 1–2 April 1920, Leonard 3457 (US); vicinity of Mission, Fonds Varettes, about 1000 m. alt., 17 April–4 May 1920, Leonard 3612 (US); Port au Prince, 150 m. alt., 21 Oct. 1924, Ekman H 2207

(US); stream near the West Indies Co., vicinity of St. Michel de L'Atalaya, Dept. du Nord, 350 m. alt., 17 Nov. 1925, *Leonard* 7079 (US); cultivated slope 6 miles north of L'Atalaya Plantation, vicinity of St. Michel de L'Atalaya, Dept. du Nord, 350 m. alt., 26 Dec. 1925, *Leonard* 8478 (F, US); among rocks on bare hill near shore east of Bord de Mer, vicinity of Jean Rabel, 6 March 1929, *Leonard & Leonard* 13792 (US); rocky slopes, east bank of River Cotes de Fer, vicinity of Jean Rabel, 31 Jan. 1929, *Leonard & Leonard* 12714 (US); SANTO DOMINGO—without definite locality or date, *Bertero* (M); Rincon, Prov. Barahona, Oct. 1911, *Fuertes* 1301 (K, US, V); JAMAICA—Kingston Street, 9 Dec. 1890, *Hitchcock* (M); Kingston, Nov. 1849, *Prior* (K); CURACAO—fields near Willemstad, 20–27 March 1913, *Britton & Shafer* 2914 (F, US); without definite locality, 17 Feb. 1917, *Curran & Haman* 29 (US); PORTO RICO—on the Adjuntas road, four miles from Ponce, 21 Nov. 1902, *Heller* 6091 (ANSP, F, M, US); Rincon, near Calvache, 7 Dec. 1886, *Sintenis* 5620 (M, US); Coamo, 4 Nov. 1885, *Sintenis* 2693 (US); San Idlefonso, Coamo Springs Road, 22 Nov. 1899, *Goll* 704 (US); CUBA—eastern Cuba, 1859–60, *Wright* 208 (V); Prov. Pinar del Rio, Baños San Vicente, 12–16 Sept. 1910, *Britton, Britton & Gager* 7393 (F, US); Prov. Pinar del Rio, base of Sierra Guana, 26 Nov. 1911, *Shafer* 10557 (F, M, US); side of trail, Prov. Pinar del Rio, Sierra Caliente, south of Sumidero, 15–16 Aug. 1912, *Shafer* 13738 (ANSP, US).

SOUTH AMERICA: COLOMBIA—without definite locality or date, *Andrè* 514 (K); Mayquetia, *Oslo* 439 (V); Santa Marta, 250 ft. alt., Aug. 1898–1901, *Smith* 477 (ANSP, F, M, US); La Manuela, near Palmira, eastern side of Cauca Valley, State of Cauca, 1100–1302 m. alt., Dec. 1905–Jan. 1906, *Pittier* 826 (US); Sierra de la Teta, without date, *Dawe* 559 (K, US); vicinity of Cartagena, 1919, *Heriberto* 23 (US); vicinity of Cartagena, 1919, *Heriberto* 137 (US); Dept. Bolívar, vicinity of Cartagena, 2–5 Nov. 1926, *Killip & Smith* 14042 (US); Palmos de Varela, Barranquilla and vicinity, 20 Dec. 1929, *Elias* 779 (US); VENEZUELA—near Colonia del Tovar, 1854–55, *Fendler* 453 (M); waste places, Lower Catuche Wood above Caracas, 1000–1200 m. alt., 2 Sept. 1917, *Pittier* 7350 (US); vicinity of Valencia, State of Carabobo, 400–800 m. alt., 16 Aug. 1920, *Pittier* 9027 (US); Curueuti, near Maiquetia, 1 June 1922, *Pittier* 10352 (US); Las Mostazas, Miranda, on railroad beyond Los Teques, 963 m. alt., *Allart* 188 (US); PERU—near Tarapoto, eastern Peru, 1855–6, *Spruce* 4922 (K, V); Tarapoto, Dec. 1904, *Ule* 6646 (K); Dept. Puna, Tablazo River, northeast of Talara, 29 March 1929, *Haught* 217 (US); plain southeast of Hacienda La Choza, Tumbes, 100–200 m. alt., 28 Feb.–3 March 1927, *Weberbauer* 7700 (US); ECUADOR—in tropical region, near Guayaquil, June 1928, *Mille* 171 (US); oil camp between Guayaquil and Salinas, Prov. Guayas, 0–100 m. alt., 21–24 June 1923, *Hitchcock* 20053 (US); Chanduy, without date, *Spruce* 6463 (V); BOLIVIA—subtropical region, Milluguaya, Nord Yungas, 1300 m. alt., Dec. 1917, *Buchtien* 4357 (US); vicinity of Cochabamba, 1890, *Bang* 748 (F); Bermejo, 1400 m. alt., 2 Dec. 1903, *Fiebrig* 2316 (K); BRAZIL—Cera, on low ground in interior of state, 26 May 1929, *Bolland* 31 (K).

SECTION II. BARTONIA Torrey & Gray

Section II. BARTONIA Torrey & Gray, Fl. N. Am. 1: 534.
1840; Brewer & Watson, Bot. Calif. 1: 236. 1876; Gilg in Engl.

& Prantl, Nat. Pflanzenfam. 3^{te}: 111. 1894; Urban & Gilg in Nov. Act. Nat. Cur. [Abh. K. Leop.-Carol. Deutsch. Akad. Naturf.] 76: 85. 1900.

Biennials or perennials; stems smooth or scabrous; leaves sessile, rarely petiolate, sinuate-dentate to deeply pinnatifid; flowers yellow, rarely white, often large, showy; petals 5 or 10; filaments numerous, 30–200, the outer filaments more or less dilated to petaloid and sterile; capsule oblong to turbinate, broad, attenuated, sessile to subsessile; placentae broad horizontal lamellae; seeds 50–80, in 2 series, horizontal, flattened, suborbicular-winged, granulate-punctate to almost smooth, opaque. Spp. 20–46.

KEY TO THE SPECIES OF SECTION BARTONIA

- A. Calyx-lobes long (10–40 mm. long).
 - B. Outer 5 filaments petaloid; floral bracts adnate to the calyx-tube.
 - C. Flowers large; petals 50–80 mm. long.....20. *M. decapetala*
 - CC. Flowers small; petals 20–35 mm. long.....21. *M. stricta*
 - BB. Outer filaments usually not petaloid; floral bracts free from the calyx-tube.
 - C. Petals 15–20 mm. long; capsule 15–20 mm. long.....23. *M. Brandegeei*
 - CC. Petals 50–80 mm. long; capsule 30–40 mm. long.....22. *M. lacvicaulis*
- AA. Calyx-lobes short (2–15 mm. long).
 - B. Capsule erect.
 - C. Outer filaments petaloid.
 - D. Leaves entire or slightly dentate.
 - E. Stem pubescent.
 - F. Leaves linear-oblong; stem and leaves persistently white-pubescent.
 - G. Leaves thick, margins revolute, grayish-green.....28. *M. leucophylla*
 - GG. Leaves thin, margins not revolute, pale green.....43. *M. oreophila*
 - FF. Leaves oblanceolate to ovate; stem and leaves not persistently white-pubescent.....42. *M. integra*
 - EE. Stem smooth, polished.
 - F. Petals spatulate, 10 mm. long.....24. *M. polita*
 - FF. Petals oblanceolate, 6–8 mm. long.....25. *M. argillosa*
 - DD. Leaves sinuate-dentate to pinnately toothed or lobed.
 - E. Flowers distinctly yellow.
 - F. Flowers greenish-yellow.....46. *M. lutea*
 - FF. Flowers lemon-yellow to golden.
 - G. Upper leaves entire, lower leaves pinnatifid.....29. *M. multicaulis*
 - GG. Upper and lower leaves pinnatifid or lobed.
 - H. Plants caespitose.....26. *M. perennis*
 - HH. Plants not caespitose.

- I. Petals obtuse.
- J. Capsule 15–20 mm. long, base acute..... 36. *M. multiflora*
- JJ. Capsule 8–15 mm. long, base rounded.
- K. Anthers minutely scabrous..... 41. *M. pterosperma*
- KK. Anthers glabrous.
- L. Stems scabrous; calyx-lobes 6–8 mm. long.....
- 45. *M. puberula*
- LL. Stems nearly glabrous; calyx-lobes 9–11 mm. long
- 44. *M. longiloba*
- II. Petals acute.
- J. Capsule 7–10 mm. long..... 27. *M. humilis*
- JJ. Capsule 10–20 mm. long.
- K. Leaves small, mostly less than 6 cm. long; petals 15 mm. or less long.
- L. Stem simple at base; lobes of leaves short, broadly oblong.
- M. Capsule 15–20 mm. long..... 37. *M. pumila*
- MM. Capsule 10–12 mm. long. 37a. *M. pumila* var. *procera*
- LL. Stem branched at base; lobes of leaves narrowly linear-lanceolate 30. *M. densa*
- KK. Leaves large, more than 5 cm. long; petals 15 mm. or more long.
- L. Stem erect at base; leaves divided to near midrib, lobes linear-oblong..... 40. *M. laciniata*
- LL. Stem decumbent at base; leaves divided halfway to midrib, lobes ovate to triangular. 38. *M. chrysanthia*
- EE. Flowers pale yellow to nearly white.
- F. Petals 15–50 mm. long.
- G. Petals 15–22 mm. long.
- H. Lower leaves 10–20 cm. long, lanceolate, upper leaves broad at base
- 39. *M. Eusbyi*
- HH. Lower leaves less than 5 cm. long, upper leaves attenuated, mostly entire, crowded..... 35. *M. strictissima*
- GG. Petals 20–50 mm. long..... 34. *M. nuda*
- FF. Petals 70–80 mm. long..... 33. *M. albescens*
- CC. Outer filaments linear, not petaloid..... 31. *M. Torreyi*
- BB. Capsule reflexed..... 32. *M. reflexa*

20. *M. decapetala* (Pursh) Urban & Gilg in Ber. Deut. Bot. Ges. 10: 263. 1892; in Engl. & Prantl, Nat. Pflanzenfam. 3rd: 111. 1894, and ed. 2, 21: 534. 1925; Britton & Brown, Ill. Fl. 2: 459. 1897; Urban & Gilg in Nov. Act. Nat. Cur. [Abh. K. Leop.-Carol. Deutsch. Akad. Naturf.] 76: 89. 1900; Gray, Man. Bot. ed. 7. 588. 1908; Coulter & Nelson, Man. Bot. Rocky Mts. 324–325. 1909; Wooton & Standley in Contr. U. S. Nat. Herb. [Fl. N. Mex.] 19: 432–434. 1915; Rydb. Fl. Rocky Mts. & Adj.

Plains, 570-572. 1922; Tidestrom in Contr. U. S. Nat. Herb. [Fl. Utah & Nev.] 25: 362-363. 1925.

M. ornata Torr. & Gray, Fl. N. Am. 1: 534. 1840.

Bartonia decapetala Pursh in Sims, Bot. Mag. 36: pl. 1487. 1812.

Bartonia ornata Pursh, Fl. Am. Sept. 1: 327. 1814; Nutt. Gen. 1: 297. 1818.

Bartonia superba Barton, Fl. N. Am. 3: pl. 81. 1823.

Torreya ornata Eaton, Man. Bot. ed. 7, 560. 1836; Wats. Bibl. Index, 391. 1878.

Hesperaster decapetalus (Pursh) Cockerell in Torreya 1: 142. 1901.

Touterea ornata Eaton & Wright, N. Am. Bot. 454. 1840; Wats. Bibl. Index, 391. 1878.

Touterea decapetala Rydb. in Bull. Torr. Bot. Club 30: 276. 1903.

Nuttallia decapetala Greene in Leaflets Bot. Obs. & Crit. 1: 216. 1906.

Perennial from a long succulent fusiform root, stout, coarse, scabrous; stems solitary, erect, branched above 3-10 cm. high, striate to subangular, pale yellow to yellowish-brown, scabrous the entire length, with short closely appressed, ascending verticillate glochidiate and spine-like hairs; leaves alternate, lanceolate to oblong-lanceolate, 5-15 cm. long, acute, sharply and interruptedly sinuate-pinnatifid, upper sessile, lower narrowed to a petiolar base, upper and lower surfaces harsh and scabrous with stout appressed spine-like hairs; flowers usually solitary, sessile, terminal, large, yellowish-white and odorous, subtended by several deeply pinnatifid, long-attenuated bracts extending to about one-half the length of the calyx-lobes; calyx-tube oblong to turbinate-oblong, 20-30 mm. long, bracteolate, canescent, densely scabrous with long verticillate glochidiate and spine-like hairs; calyx-lobes 5, lanceolate, 25-40 mm. long, long-acuminate, persistent, with prominent midvein, inner surface pilose, outer surface with short stiff appressed verticillate spine-like hairs; petals 10, pale yellow to almost white, concave, lanceolate-ovate, acute at the apex, spreading, unguiculate, sparsely pilose at the apex,

about twice the length of the calyx-lobes, inner 5 somewhat smaller, representing petaloid staminodia; filaments numerous (200), filiform, erect, in 4-5 series, 3.5-4.5 cm. long, anthers linear to oblong-linear, base emarginate, not contorted; style equalling length of stamens, filiform, angled, 5-7-parted, papillose at the apex and margins, early deciduous in the fruit; capsule oval to oblong, 3-4 cm. long, obtuse, attenuated toward the base, brownish-gray, scabrous, many-nerved, crowned by more or less erect persistent calyx-lobes; seeds in 2 series, horizontal, numerous, margined but not winged, obovate, 3 mm. long, convex, grayish-brown, minutely granulate-punctate.

Distribution: plains and foothills from western Iowa northwestward to Canada and Montana, south to Mexico.

Specimens examined:

INDEFINITE LOCALITY: Northwest Territory, Nicollet Expedition, *Geyer* 200 (ANSP, M); Simpson's Cut, 7 July 1859, *Simpson's Expedition* (M); Missouri, *Rafinesque* (ANSP); banks of Missouri, 15 Sept. 1864, *Rothhammer* 508 (US).

IOWA: Sioux City, 29 Aug. 1896, *Pammel* 25 (CAS, F, M, RM, US).

NORTH DAKOTA: Medora, 9 Sept. 1891, *Wright* (RM); without definite locality, Sept. 1898, *Westergaard* (RM); Medora, Aug. 1909, *Bailey* (US); clay bluffs near Bismarck, 13 Aug. 1927, *Larsen* 167 (ANSP, M).

SOUTH DAKOTA: common on sand hills, *Skinner* 215 (RM); banks of Cheyenne River, Smithville, 8 Aug. 1891, *Williams* (M); Forest City, Aug. 1892, *Griffiths* (M, US); Running Water, Sept. 1892, *Thornber* 1384 (M, US); Hot Springs, 3500 ft. alt., 9 Aug. 1892, *Rydberg* 713 (US); Hot Springs, Sept. 1893, *Safford* (US); Hot Springs, 27 Aug. 1898, *Williams* (ANSP); bluffs of Missouri River, Evarts, 30 Aug. 1906, *Moyer* 2520 (RM); South Cave Hills, Aug. 1910, *Fromme* (M); clay banks, Slim Buttes, Harding Co., 21 Aug. 1910, *Visher* 251 (F, RM); along cut banks, Spearfish Beds, 7 miles west of Rapid City, 10 Aug. 1925, *Lee* (RM).

NEBRASKA: prairies, Belmont, *Weber* (M); on Missouri, near Yankton to St. Helena, *Bruhin* (M); common on bluffs and sand hills, Fort Pierre, 1854, *Hayden* 40 (M); Grand Rapids, 18 Aug. 1893, *Clements* 2843 (US); Muddy Gulch, Scotts Bluff Co., 3 Aug. 1900, *Baker* (M); clayey soils, Sioux Co., Aug.-Sept. 1927, *Kramer* 201 (M); Franklin Co., 25 Aug. 1929, *Hapeman* (ANSP).

KANSAS: limestone hills, near Bogue, *Imler* 49 (M); without definite locality, Sept. 1885, *Oyster* 2801 (CAS); Rockport, 20 Aug. 1889, *Bartholomew* (M); naked clays of bluffs, Caldwell, 10 Sept. 1890, *Smyth* 274 (US); red clay bluffs near river, Medicine Lodge, 12 Sept. 1890, *Smyth* 299 (US); stony hills, Morton Co., 6 Aug. 1895, *Hitchcock* 175 (M, RM, US).

OKLAHOMA: near Alva, 12 Oct. 1896, *Ward* 53 (US); sandy open ground, Altus, Jackson Co., 26 Oct. 1917, *Palmer* 13072 (M); near Duke, Jackson Co., 5 Aug. 1927, *Stratton* 311 (M).

TEXAS: banks of Fish Creek, Dallas Co., Aug. 1897, *Reverchon* 325 (F, M, US); banks of Fish Creek near Dallas, *Reverchon* 959A (CAS, F, M, US); Fish Creek, Dallas, July 1879, *Reverchon* (F); cultivated at Dallas, Aug. 1882, *Letterman* 140 (M, US); Dallas, 450 ft. alt., 20 July 1882, *Letterman* 171 (M); low sandy brakes, Chillicothe, 27 Sept. 1906, *Ball* 1161 (US); sandy soil, Garza Co., Oct. 1923, *Euth* 1150 (US); dry banks of canyon, Post, Garza Co., E. J. Palmer 14562 (M); Spur, 19 Oct. 1930, *Reed* 3241 (US).

CANADA: Alberta, Medicine Hat, Assiniboia, Aug. 1895, *Macoun* 10650 (US).

MONTANA: indefinite locality, without date, *Fitch* (D, P, RM); *Fitch* 39 (RM); *Fitch* 77 (M); Great Falls, 1 Aug. 1885, *Anderson* 161 (UM); Great Falls, 27 Aug. 1886, *Williams* 54 (US); indefinite locality, 27 July 1890, *Blankinship* 99 (US); Colgate, 6 Sept. 1892, *Sandberg*, *MacDougal & Heller* 1033 (CAS, US); Glendive, Sept. 1892, *Sandberg* (P, RM); near St. Peters Hospital, Helena, July 1894, *Stars* (M); Emigrant Gulch, 6500 ft. alt., 22 Aug. 1897, *Rydberg & Bessy* 4545 (F, US); Deep Creek Canyon, Big Belt Mts., 14 Aug. 1899, *Blankinship* (P, RM); Gardiner River, 26 July 1902, *Mearns* 2333 (US); Harr, 15 Aug. 1902, *Mearns* 3289 (US); sandy draw, Great Falls, 3000 ft. alt., 28 July 1906, *Blankinship* 697 (F, UM, US); cut bank, 3 Sept. 1921, *Wooton* (US).

WYOMING: Fort Union, Yellowstone Park, 1852, *Carrey* (US); Smith's Fork, Yellowstone River, 10 May 1860, *Hayden* (M); Hot Springs, north of Gardiner, 26 July 1888, *Knowlton* (US); Big Horn Mts., Aug. 5, 1892, *Buffum* 347 (RM); near Mammoth Hot Spring, Yellowstone Park, 6000 ft. alt., July 1893, *Burglehaus* (M, US); Fairbanks, 14 July 1894, *Nelson* 486 (M, US); Platte River, 14 July 1894, *Nelson* 3019 (RM); Parkman, 22 July 1896, *Nelson* 2456 (RM); Devils Tower, 17 Aug. 1897, *Griffiths* (CAS, RM); Buffalo, 4000–5000 ft. alt., Oct. 1900, *Tweedy* 3618 (RM); ditch banks, Jelm, Albany Co., 12 Aug. 1900, *Nelson* 3074 (M, P, RM, US); railroad grade, Moorcraft, 2 July 1901, *Nelson* 8549 (RM); Yellowstone Park, Aug. 1901, *Martin* (P); rocky hillsides, Red Bank, Big Horn Co., 22 July 1901, *Goodding* 477 (M, P, RM, US); Fort Yellowstone, 28 July 1902, *Smith* 102 (US); Mammoth Hot Springs, Yellowstone Park, 1900 m. alt., 28 July 1902, *Mearns* 2357 (US); Mammoth Hot Springs, Yellowstone Park, 2 Aug. 1902, *Mearns* 2754 (D, US); near Mammoth Hot Springs, Yellowstone Park, 4 Aug. 1902, *Mearns* 2825 (US); near Mammoth Hot Springs, 1 mile post, Yellowstone Park, 1793 m. alt., 30 July 1902, *Mearns* 2514 (US); hills southeast of Sheridan, 14 July 1913, *Sharp* 380 (RM); hillside above Madison's Ranch, Clark, 4000 ft. alt., 3 Aug. 1925, *Pearson* 279 (RM); New Haven, 1926, *Stinson* 2 (RM).

COLORADO: Monument Park, without date, *Walker* (F); Leadville, without date, *Schedler* (RM); near Canyon City, 1874, *Brandegee* (ANS, F, M,); marl hills at Pueblo, 6 Sept. 1881, *Engelmann* (M); Pueblo, 1889, *Evermann* (US); Boulder Canyon, 2 miles west of Boulder, 4 Sept. 1892, *Baker* (P); Fort Collins, 10 June 1894, *Baker* (P); sandy creek bottoms, 7000 ft. alt., 10 Sept. 1900, *Vreeland* 660 (RM); foothills near Fort Collins, Aug. 1900, *Smith* (US); plains west of Loveland, Larimer Co., 21 July 1900, *Osterhout* 2204 (P, RM, US); plains and foothills near Boulder, 5000–6000 ft. alt., July 1902, *Tweedy* 5144 (RM); dry hills, Greenhorn, Pueblo Co., 1900 m. alt., 2 Sept. 1921, *Clokey* 4218 (ANS, CAS, D, F, M, P, RM, US); Pawnee Buttes, Sligo, 2 Aug. 1925, *Johnston* 133 (RM).

NEW MEXICO: prairies between Red River & Rock Creek, 21 Aug. 1847, *Fendler*

240 (C, M); Bear Canyon, Raton Range, 10 Sept. 1903, Howell 189 (US); Colfax, 13 Aug. 1910, Wooton (US).

IDAHO: Salmon, Salmon River, 31 Aug. 1895, Henderson 3948 (US).

MEXICO: Sonora, ex herbarium Dr. Torrey (US).

21. *M. stricta* (Osterhout) Stevens ex Jeffs & Little in Publ. Univ. Okla. Biol. Surv. [Prelim. List Ferns & Seed Pl. Okla.] 2: 73. 1930; Coulter & Nelson, Man. Bot. Rocky Mts. 325. 1909 (in synonymy under *M. nuda* (Pursh) T. & G.).

Hesperaster strictus Osterhout in Bull. Torr. Bot. Club 29: 174. 1902.

Touterea stricta Osterhout in Bull. Torr. Bot. Club 30: 276. 1903; Rydberg, Fl. Colo. 236. 1906.

Nuttallia stricta Greene in Leaflets Bot. Obs. & Crit. 1: 210. 1906; Wooton & Standley in Contr. U. S. Nat. Herb. [Fl. N. Mex.] 19: 435. 1915; Rydb. Fl. Rocky Mts. & Adj. Plains, ed. 2. 572. 1922; Rydb. Fl. Prairies & Plains Cent. N. Am. 557. 1932.

Perennial, strict, branching above, scabrous with spine-like and verticillate glochidiate hairs; stems whitish, somewhat striated, hispid, 5–10 dm. high, leafy; leaves sinuate-dentate, linear to oblong-lanceolate, hispid on upper and lower surfaces with short stout barbed spine-like pustulate hairs; basal leaves 7–10 cm. long, obtuse, shortly petiolate, upper leaves smaller, sessile, apex acuminate, base cuneate; flowers corymbose, small, mostly solitary, pale yellow, subtended by several laciniate acuminate bracts; calyx-tube 10–15 mm. long, tapering when young, hispid, almost entirely concealed by bracts; calyx-lobes deltoid-acuminate, 10–20 mm. long, hispid, occasionally laciniately divided, simulating a subtending bract; petals 10, 2–3.5 cm. long, oblanceolate, acute, narrowed to a claw about one-third of the length; outer filaments dilated, antheriferous, nearly equaling length of petals, inner filaments filiform, in several series, less than half the length of outer ones, anthers oblong, 1 mm. long, glabrous; style 2 cm. long, slender, deeply 3-parted to two-thirds of its length, glabrous; capsule stout, oblong-cylindric, 2–3 cm. long, ribbed or striated, hispid, yellowish-brown, crowned with the withered persistent

calyx-lobes and style; seeds numerous, flattened, obovate, 4–5 mm. long, wing-margined, minutely muriculate.

Distribution: plains and foothills from South Dakota to Texas, west to southern Montana and New Mexico.

Specimens examined:

SOUTH DAKOTA: indefinite locality, *Skinner 215a* (RM); Iron Springs, Bad Lands, 28 Aug. 1889, *Williams & Wilcox 372* (US); Hot Springs, 3500 ft. alt., 3 Aug. 1892, *Rydberg 714* (US); Hot Springs, Aug. 1893, *Macbride* (F, M); Hot Springs, Aug. 1898, *Williamson* (ANS); clay banks, Shannon Co., 29 July 1924, *Over 15843* (RM); along draws, on plains, Fall River Falls, Hot Springs, 23 July 1924, *McIntosh 510* (RM); hillsides near Cascade Springs, Fall River Co., 24 Aug. 1925, *Over 16996* (RM); Rocky Valley, Hill Canyon, 8 miles northeast of Dewey, 28 July 1927, *Hayward 2444* (RM).

NEBRASKA: indefinite locality, 12 July 1851, *Hayden* (M); South Platte to Pale Creek, July 1856, *Engelmann* (M); on the Running Water, Sheridan Co., 1–10 July, 1886, *Hatcher* (C); Pine Ridge, 25 July 1889, *Webber* (M); prairies, Belmont, Dawes Co., 25 July 1889, *Webber* (US); sand draws, Deuel Co., Aug. 1890, *Rydberg* (US); McColligan Canyon, 22 Aug. 1891, *Rydberg 123* (US); Turner, 24 July 1893, *Clements 2772* (US); South Fork of Dismal River, 14 Aug. 1893, *Rydberg 1689* (US); Bridgeport, Cheyenne Co., 3700 ft. alt., 6 Aug. 1901, *Baker* (M); Scotts Bluff Co., 4100 ft. alt., 13 Aug. 1901, *Baker* (M); dry clay slopes along Lincoln Highway near Deep Spring, 27 Aug. 1926, *Heller 14296* (D, M); sandy prairies, July–Sept. 1927, *Kramer 166* (M).

KANSAS: Wallace Co., *Snow* (C, US); Arkalon, sand hills, 16 Aug. 1890, *Smyth 147* (US); Medicine Lodge, above bluffs, 12 Sept. 1890, *Smyth 307* (US); Gray Co., June 1891, *Carleton 328* (F); Syracuse, 19 July 1893, *Thompson 123* (C, M, US); Seward Co., Sept. 1893, *Gurney* (M); prairie, Logan Co., 27 July 1895, *Hitchcock 176* (M, RM, US); sand hills, Finney Co., 11 Aug. 1895, *Hitchcock 177* (US); Belvidere, 19 Sept. 1897, *Ward* (US); vicinity of Tribune, 18 Sept. 1912, *Rose & Fitch 17083* (US); sand hills, 13 miles southwest of Lakin, 13 July 1929, *Rydberg & Imler 912* (M).

OKLAHOMA: Greer Co., 19 July 1901, *White* (RM); sandy open places, Frederick, 4 July 1903, *Duncan 37* (M); near Fairvalley, Woods Co., 15 July 1913, *Stevens 1714* (D, M, US); near Alva, Woods Co., 23 July 1913, *Stevens 1765* (D, M, US); near Alva, Woods Co., 24 Sept. 1913, *Stevens 2843* (M, US); sandy open ground, Ryan, Jefferson Co., 23 July 1917, *E. J. Palmer 12603* (M); sandy soil near Headrick, Jackson Co., 25 Aug. 1927, *Stratton 306* (M).

TEXAS: *Fremont's Expedition 177* (M); indefinite locality, *Berlandier 590, 2000* (M); Vernon, *Reverchon* (M); Fort Smith to Rio Grande, 1853–54, *Bigelow* (US); bank of Brazos, Seymour, Baylor Co., Sept. 1897, *Reverchon 384* (F, M, US); western Texas, Aug. 1881, *Havard* (US); Canadian, 26 Aug. 1892, *Bailey* (US); prairies, Canadian, Hemphill Co., 11 Aug. 1900, *Eggert* (M); prairies north of Stanton, Martin Co., 13 June 1900, *Eggert* (M); prairies, north of Colorado, Mitchell Co., 9 June 1900, *Eggert* (M); Colorado, 16 Oct. 1902, *Tracy 5337* (F, M, US); Lelia, 25 June 1902, *Reverchon* (M); sandy plains, Estelline, 9 July 1903, *Reverchon 3836* (M, P, US); Texline, 6 Aug. 1903, *Howell 135* (US);

prairies, north of Vernon, Wilbarger Co., 18 Sept. 1903, *Eggert* (M); Palo Duro Canyon, Randall Co., 2 Sept. 1907, *Ball* 1812 (US); Sweetwater, 31 Oct. 1913, *Wooton* (US); sandy open ground, Fredericksburg, Gillespie Co., 5 June 1916, *E. J. Palmer* 10058 (M); dry open ground, Sweetwater, Nolan Co., 21 Oct. 1917, *Palmer* 15048 (M); Pease River bottoms near Vernon, Wilbarger Co., 20 Aug. 1921, *Ferris & Duncan* 3351 (CAS, M); 17 miles south of San Antonio, May 1921, *Schulz* 578 (US); sandy waste ground, Garza Co., 30 June 1924, *Ruth* 1204 (CAS); near Posoy Canyon, Lubbock Co., 4 June 1930, *Demaree* 7763 (M); Slaton, 24 Sept. 1930, *Reed* 3230 (US).

MONTANA: Clear Creek, 14 miles above Glendrive, 25 July 1883, *Ward* (US); Glendrive, July 1892, *Aiton* (ANSF, D, F, RM).

WYOMING: head of Big Sandy, 18 July 1891, *Buffum* 345 (RM); Grant, 8 July 1894, *Nelson* 338 (M, RM, US); Cummins, 28 July 1895, *Nelson* 1470 in part (P); Lance Creek, 10 July 1896, *Knowlton* 165 (US); Deer Creek, Converse Co., 14 July 1901, *Nelson* 8408 (M, RM, US); indefinite locality, 1901, *Nelson* (RM); New Castle foothills, 9 July 1927, *Hayward* 2046 (RM).

COLORADO: Denver, *Smith*, (ANSF); Clear Creek, 1862, *Hall & Harbour* 569 (ANSF, F); indefinite locality, 1862, *Hall* (US); Colorado Springs, Aug. 1871, *Meehan* (ANSF); Canyon City, 1871, *Brandegee* 89 (C, M); plains near Denver, 20 Aug. 1871, *Smith* (ANSF); Platte River bottom, Denver, 17 July 1872, *Redfield* 464 (ANSF, M); divide between Denver and Colorado Springs, 20 Sept. 1874, *Engelmann* (M); Middle Park, 1875, *Patterson* (F); Boulder, 1 Sept. 1875, *Henry* (M); along the Platte River, Denver, 5000 ft. alt., 20 Aug. 1878, *Jones* 661 (P); Hot Springs, Canyon City, 30 Aug. 1881, *Engelmann* (M); Platte Valley below Greeley, 3 Aug. 1881, *Ward* (US); near Denver, 5200 ft. alt., Aug. 1884, *Letterman* 169 (F, M); Manitou, 10 Aug. 1884, *Letterman* (M); Colorado Springs, 1886, *Bartlett* (C); Breckenridge, 1887, *Bereman* 734 (M); Pueblo, 1889, *Evermann* (US); Colorado Springs, Sept. 1892, *Mulford* (M); Fort Collins, 5000 ft. alt., 29 July 1892, *Crandall* (M); rocky slopes, Manitou, El Paso Co., 6400 ft. alt., 4 Aug. 1892, *Sheldon* 426 (US); Fort Collins, 5000 ft. alt., 4 July 1893, *Baker* (P); river flats, Fort Collins, 5000 ft. alt., 26 Aug. 1895, *Cowen* 180 (US); Fort Collins, 5000 ft. alt., 6 July 1896, *Baker* (M, P); Boulder, 1896, *Andrews* (P); Denver, 1897, *Wislizenus* (M); plains near Denver, 5170 ft. alt., July 1899, *Holm* (M); dry plains near foothills, 5300 ft. alt., 11 Aug. 1899, *Crandall* 1812 (C, F, UM); prairies near foothills, 26 July 1899, *Marshall* 1213 (RM, US); New Windsor, Weld Co., 29 July 1899, *Osterhout* (CAS, RM); Windsor, Weld Co., 29 July 1900, *Osterhout* 2320 (ANSF, P); Colorado Springs, July 1900, *Harper* (M); Manitou, July 1900, *Harper* (C); New Windsor, Weld Co., 3 July 1900, *Osterhout* 2321 (US); near Greeley, Weld Co., Aug. 1901, *Osterhout* 2488 (ANSF, RM); New Windsor, Weld Co., 11 July 1901, *Osterhout* 2488 (P, US); Colorado Springs, 6000 ft. alt., 27 Aug. 1902, *Cooper* 425 (RM); plains and foothills near Boulder, 5000 ft. alt., Oct. 1902, *Tweedy* 5145 (RM); plains and foothills near Boulder, 5000–6000 ft. alt., July 1902, *Tweedy* 5146 (RM); New Windsor, Weld Co., 19 July 1904, *Osterhout* 2917 (RM); New Windsor, Weld Co., 4 Aug. 1905, *Osterhout* (RM); South Cheyenne Canyon, 11 Sept. 1905, *Glatfelter* (M); Hugo, 26 Aug. 1907, *Tidestrom* 56 (US); Flagstaff Mt., near Boulder, 14 Aug. 1906, *Robbins* 2572 (RM); along the railroad, near Boulder, 8 Aug. 1906, *Robbins* 2534 (RM); plains, Boulder, 5300 ft. alt., 31 July 1906, *Daniels* 678 (M); Hugo, 5 Aug. 1907, *Tidestrom* 56 (US); Hugo, 24

Sept. 1907, *Tidestrom* 667 (US); Colorado Springs, 1908, *Pace* 436 (M); Littleton, Aug. 1909, *Clemens* (P, RM); plains, North Denver, 20 Sept. 1910, *Eastwood* (C); dry soil, Denver, 15 July 1910, *Blake* 349 (RM); plains, North Denver, 20 Sept. 1910, *Eastwood* 152 (CAS, M, US); arid plains, North Denver, 2 Aug. 1910, *Eastwood* 16 (CAS, C, M, US); Windsor, Weld Co., 1 Aug. 1911, *Osterhout* (P); Boulder, Boulder Co., 19 Aug. 1912, *Vestal* 464 in part (P); prairie, Pike's Peak region, 20 Aug. 1912, *Brumback & Davies* 96b (F); vicinity of La Junta, 16 Sept. 1912, *Rose & Fitch* 13069 (US); dry soil, Denver, 5300 ft. alt., 9 Aug. 1915, *Clokey* 2628 (RM); dry soil, Denver, 5100 ft. alt., 5 Aug. 1916, *Clokey* (D, F); Windsor, Weld Co., 1 Aug. 1916, *Osterhout* (RM); vacant lot, North Denver, 19 Aug. 1919, *Bethel & Payson* 1616 (M, RM); Wray, Yuma Co., 1100 m. alt., 11-15 Aug. 1919, *Eggles-ton* 15542 (F, P); Florence, Fremont Co., 1000 m. alt., 2-5 Aug. 1919, *Eggles-ton* 15417 (F); prairie, Denver, 5300 ft. alt., 2 Sept. 1917, *Clokey* 2947 (CAS, F, RM, US); dry prairie, Denver, 1616 m. alt., 7 Sept. 1920, *Clokey* 3822 (ANSP, CAS, D, F, M, P, RM, UM, US).

NEW MEXICO: without definite locality, coll. of 1847, *Fendler* 241 (M); Cross L Ranch, Cimarron Canyon, 21-24 Aug. 1903, *Griffiths* 5548 (US); northeast of Clayton, 19 Aug. 1910, *Wooton* (US); Nara Vista, 7 Oct. 1910, *Fisher* 95 (US); Nara Vista, 10 July 1914, *Wooton* (US).

22. *M. laevicaulis* (Dougl.) Torrey & Gray, Fl. N. Am. 1: 535. 1840; Watson, U. S. Geol. Surv. Fortieth Parallel [Bot. King's Exp.] 5: 114. 1871; Brewer & Watson, Bot. Calif. 1: 237. 1876; Coulter, Man. Bot. Rocky Mt. Region, 107. 1885; Greene, Fl. Francisc. 234. 1891; Greene, Man. Bot. Reg. San Francis. Bay, 142. 1894; Gilg in Engl. & Prantl, Nat. Pflanzenfam. 3^{te}: 111. 1894; Howell, Fl. N. W. Am. 1: 241. 1897; Britton & Brown, Ill. Fl. 2: 459. 1897; Urban & Gilg in Nov. Act. Nat. Cur. [Abh. K. Leop.-Carol. Deutsch. Akad. Naturf.] 76: 87. 1900; Jepson, Fl. West. Mid. Calif. 323. 1901; Abrams, Fl. Los Angeles & Vic. 256. 1904; Piper in Contr. U. S. Nat. Herb. [Fl. Wash.] 11: 395. 1906; Coulter & Nelson, Man. Bot. Rocky Mts. 326. 1909; Piper & Beattie, Fl. Southeast. Wash. & Adj. Idaho, 166. 1914; Rydb. Fl. Rocky Mts. & Adj. Plains, ed. 2. 570-572. 1922; Tidestrom in Contr. U. S. Nat. Herb. [Fl. Utah & Nev.] 25: 362-363. 1925; Jepson, Man. Fl. Pl. Calif. 649. 1925.

M. ornata Torrey in Rept. Stansb. Exped. 387. 1852, not Torrey & Gray.

M. laevicaulis (Dougl.) Torrey & Gray var. *acuminata* Nels. & Macbr. Contr. Gray Herb. 65: 40. 1922.

M. acuminata Tidestr. in Contr. U. S. Nat. Herb. [Fl. Utah & Nev.] 25: 362. 1925.

Bartonia laevicaulis Dougl. in Hook. Fl. Bor. Am. 1: 221, pl. 69. [1834] 1840; Hook. & Arn. Bot. Beechey Voy. Suppl. 343. 1843; Walp. Rep. 2: 224. 1843.

Bartonia parviflora Dougl. in Hook. Fl. Bor. Am. 1: 221. [1834] 1840.

Bartonia ornata Hook. in Lond. Jour. Bot. 6: 226. 1847, not Pursh.

Hesperaster laevicaulis Cockerell in Torreya 1: 143. 1901.

Touterea parviflora Rydb. Bull. Torr. Bot. Club 30: 276. 1903.

Touterea laevicaulis Rydb. *Ibid.*

Nuttallia laevicaulis (Dougl.) Greene, Leaflets Bot. Obs. & Crit. 1: 210. 1906.

Nuttallia parviflora (Dougl.) Greene, *Ibid.*

Nuttallia acuminata Rydb. in Bull. Torr. Bot. Club 40: 61. 1913.

Perennial, coarse, stout; stems erect, 3–10 dm. high, branched, striate, shining white, nearly smooth below, scabrous with a few verticillate glochidiate and spine-like hairs above; leaves alternate, 3–15 cm. long, sessile, scabrous, canescent with short retrorse and antrorse spine-like hairs on upper surface, verticillate glochidiate hairs on lower surface; basal leaves oblanceolate, deeply pinnately lobed nearly to midvein, upper leaves ovate-lanceolate, acute or acuminate at apex, base subcordate, sinuate-pinnatifid; flowers 1–3, terminal, sessile, large, showy, pale yellow, expanding in bright sunshine, subtended by 1–3 linear-subulate irregularly toothed long-acuminate bracts; calyx-tube cylindrical, attenuated, 15–30 mm. long, densely scabrous; calyx-lobes lanceolate to ovate-oblong, acuminate, 20–40 mm. long, canescent, pubescent, reflexed and yellowish in fruit, conspicuous midnerve; petals 5, yellow, lanceolate or oblong-lanceolate, erect or spreading, 5–8 cm. long, narrowed at the base, acute or acuminate and slightly pilose at the apex, otherwise glabrous; stamens in 4–5 series, 2–4 cm. long, filaments antheriferous, 5 exterior filaments

dilated, somewhat petaloid, anthers not contorted, oblong-linear; style 3.5–6 cm. long, papillose, persistent and withered in fruit; capsule subcylindrical, slightly attenuated, obtuse at the base, 3–4 cm. long, scabrous, brownish-black, strongly striated, crowned by persistent recurved calyx-lobes and withered style; seeds numerous, in 2 series, short-obovate to obovate-rotund, 2–3.5 mm. long, winged, slightly convex, grayish-brown, minutely granulate-punctate, tuberculate.

Distribution: canyons, valleys, and dry foothills, from Montana westward to the Pacific Coast.

Specimens examined:

INDEFINITE LOCALITY: "Head of the Missouri" and "Columbia River Blue Mountains," Nuttall (ANS); Franklin Gap, Hooker (ANS TYPE); Fort Beaufort, Havard (F).

MONTANA: Hot Sulphur Springs, 24 July 1871, Allen (US); Sixteen Mile Creek, 4500 ft. alt., 10 July 1883, Lamson-Scribner 59, 60 (US); Helena, 24 July 1887, Williams 686 (US); Lower Falls of the Missouri, 18 Sept. 1887, Williams 727 (US); McCarthy, 1888, Anderson (US); bank of Big Hole River, near Willis, Oct. 1888, Anderson (UM); near Helena, 4 July 1891, Kelsey (F); Emigrant Gulch, 6500 ft. alt., 23 Aug. 1897, Rydberg & Bessey 4546 (F, US); East Flathead, 15 Aug. 1899, Jones (C, RM, US); Gardiner River, 2 Aug. 1902, Mearns 2761 (US); Yellowstone River near Gardiner, 6 July 1902, Mearns 1541 (US); Yellowstone River near Gardiner, 20 June 1902, Mearns 1259 (US); Gardiner River, 27 July, 1902, Mearns 2346 (US); Deer Lodge Valley, 5000 ft. alt., 28 July 1905, Jones (P); dry hillsides, Anaconda, 5000 ft. alt., 12 Aug. 1906, Blankinship 698 (C, F, M, RM, US); prairie, Lolo Valley, near Woodman, 9 July 1921, Kirkwood 1212 (M, UM); Yellowstone Trail between Tarkio & Superior, 2800 ft. alt., 12 July 1924, Kirkwood 1799 (UM); near East Entrance, Glacier Park, 30 June 1930, Van Dyke (CAS).

WYOMING: Hot Springs, 1872, Platt (US); dry creek bottom, North Fork Wind River, 12 July 1882, Forwood (US); Mount Evert, Yellowstone Park, 26 July Tweedy 95 (US); near Marquette, 4 Aug. 1892, Rose 118 (M, US); Garfield Peak, 1888, Knowlton (US); head of Big Goose Creek, Big Horn Mts., 15–24 July 1893, 29 July 1894, Nelson 678 (M, P, RM, US); Gardiner River, 19 July 1899, A. & E. Nelson 6000 (M, RM, US); plains between Sheridan and Buffalo, 3500–5000 ft. alt., 15 June–15 July 1900, Tweedy 3617 (RM); Meyer's Ranch, south of Evanston, Bear River, 7000 ft. alt., 26 July–1 Aug. 1902, Pammel & Blackwood 4046 (M); Gardiner River, near Ft. Yellowstone, 27 July 1902, Smith 98 (US); Mammoth Hot Springs, 29 July 1902, Smith (F); Gardiner River Mt., 2 Aug. 1902, Mearns 2761 (F); Yellowstone Park, 29 July 1902, Mearns 3652 (US); Yellowstone Park, 27 July 1902, Mearns 2356 (US); Slater, 20 July 1903, Goodding 1725 (RM, US); Holm Lodge, Aug. 1911, Reynolds 159 (F); Snake River below Jackson, Teton Co., 20 Aug. 1922, Payson & Payson 3081 (RM); Shoshone Canyon, 10 Aug. 1924, Nelson 10117 (M).

IDAHO: Ketchum, without date, *Broadhead* 22 (P); without definite locality or date, *Wissels* (US); Palouse country and about Lake Coeur d'Alene, June-July 1892, *Aiton* (F, M, P, RM, US); Snake River, 2 July 1892, *Mulford* (M); Post Falls, Kootenai Co., 14-17 July 1892, *Heller* 651 (ANSP, F); banks of Spokane River, Kootenai Co., 15 July 1892, *Sandberg*, *MacDougal* & *Heller* 651 (CAS, F, M, P, US); sandy banks, Kootenai Co., July 1892, *Sandberg* (C, F, M); shores of Lake Coeur d'Alene, 18 July 1895, *Leiberg* 1320 (C, F, M, P, RM, US); dry bluffs, Bay Horse Creek, Custer Co., 1895, *Henderson* 3743 (US); Bear Lake, 9 Aug. 1898, *Mulford* 287 (M); Weiser, Washington Co., 2200 ft. alt., 7 July 1899, *Jones* (P); St. Anthony, 15 Aug. 1900, *Merrill* 451 (US); Deer Sawtooth National Forest, 21 Aug. 1909, *Woods* & *Tidestrom* 2807 (US); hillside, Boise, 2880 ft. alt., 6 Sept. 1911, *Clark* 313 (C, F, M, P, RM, US); volcanic boulder banks, King Hills, Elmore Co., 2580 ft. alt., 17 July 1911, *Nelson* & *Macbride* 1164 (C, F, M, P, RM, US); shore, Lake Coeur d'Alene, near Silver Beach, Aug. 1912, *Rust* 181 (US); Pocatello, July 1921, *Soth* P-120 (RM); Pocatello, 1926, *Donaghe* 52 (CAS); slopes near Riggan, July 1926, *Khodenbaugh* 12 (RM); Downey, 23 Aug. 1931, *Howell* 7940 (CAS).

UTAH: without definite locality, *Vasey* (F); Thompson Creek, 7 July 1859, *Engelmann* (M); mountains west of Camp Floyd, pass near Rush, 4 Aug. 1859, *Engelmann* (M); Glenwood, 10 June 1875, *Ward* 216 (F, M, US); Kane Co., 1875, *Siler* (M); without definite locality, 1877, *Palmer* 170 (M); City Creek Canyon, 5300 ft. alt., 25 July 1879, *Jones* 1462 (P); Milford, 17 June 1880, *Jones* (P); American Fork Canyon, 4 Aug. 1880, *Jones* (P); City Creek Canyon, Salt Lake City, 26 July 1883, *Summers* (US); Fish Spring, 4 June 1891, *Jones* (P); Provo, 6000 ft. alt., 10 July 1894, *Jones* 5609 (C, F, M, P, RM, US); Panguitch Lake, 8400 ft. alt., 6 Sept. 1894, *Jones* 6003t (P); Logan Canyon, 15 June 1897, *Williams* (CAS); Diamond Valley, 4000-5000 ft. alt., May-Oct. 1898, *Purpus* 6190 (C); Logan Canyon, 18 July 1898, *Mulford* 169 (M); American Fork Canyon, 20 June 1902, *Goodding* 1171 (M, RM, US); Salt Lake City, 16 Aug. 1902, *Cooper* 4200 (RM); Ogden Canyon, 5000-6000 ft. alt., 17 July 1902, *Pammel* & *Blackwood* 3749 (M); Salt Lake City, 16 Aug. 1902, *Cooper* 4200 (368) (RM); along Sevier River, below Marysville, 20 July 1905, *Rydberg* & *Carlton* 6960 (RM, US); Beck's Hot Springs, Salt Lake Co., 4500 ft. alt., 18 July 1905, *Garrett* 1495 (RM); Fort Douglas, 4 Oct. 1909, *Clemens* (CAS, RM); Hot Springs, 17 Aug. 1909, *Clemens* (RM); Logan Boulevard, Cache Co., 2 Aug. 1909, *Smith* 1961 (RM); Salt Lake City, 27 June 1916, *Eastwood* 7719 (CAS); Sevier Station, Sevier Co., 1680 m. alt., 21 Sept. 1918, *Eggleston* 14936 (US); north of Salt Lake City, 13 Sept. 1924, *Garrett* 3232 (RM).

NEVADA: ravine near Virginia City, Sept. 1863, *Bloomer* (US); near Virginia City, 1863-64, *Bloomer* (US); Ruby Valley, 6000 ft. alt., Aug. 1868, *Watson* 432 (US); without definite locality, 1872, *Wheeler* (US); near Virginia City, 1874, *Moore* (M); Muncey, 6 July 1891, *Jones* (P); Spencemont, 20 July 1891, *Jones* (P); Quinn River Crossing, July 1901, *Griffiths* & *Morris* 390 (US); ridge above Cave Creek post-office, Elko Co., 6250 ft. alt., 20 Aug. 1908, *Heller* 9520 (ANSP, M, US); west side of Walker Lake, Mineral Co., 16 Aug. 1927, *Haley* (CAS); ridge, north side Lee Canyon, Charleston Mts., Clark Co., 8700 ft. alt., 2 Aug. 1913, *Heller* 11053 (ANSP, F, M, US); vicinity of Austin, 1950 m. alt., 26 July 1913, *Hitchcock* 721 (US); vicinity of Austin, 1950 m. alt., 25 July 1913, *Hitchcock* 651

(US); Hunters Canyon, vicinity of Reno, 1350–1500 m. alt., 18 July 1913, Hitchcock 572 (US); Charleston Mts., Clark Co., 7000 ft. alt., 12 Sept. 1925, Jaeger (P); Charleston Mts., 3 July 1927, Jones (P); five miles west of Reno, 26 Aug. 1931, Howell 8005 (CAS, M).

OREGON: indefinite locality, Hopkins (US); indefinite locality, 1871, Hall 199 (F, M); Camp Harvey, 1875, Bartholf (M); gravel bars, eastern Oregon, Aug. 1880, Howell (F); The Dalles, Oct. 1881, Howell (US); Lost Valley, Gilliam Co., 940 m. alt., 9 Sept. 1894, Leiberg 886 (C, US); near Pendleton, 1000 m. alt., 3 Sept. 1896, Leiberg 2633 (US); Tygh Valley, Wasco Co., 31 Aug. 1897, Coville & Applegate 738 (US); Ione, Morrow Co., 14 July 1903, Lunell (RM); Mitchell, Wheeler Co., 2975 m. alt., 1 Aug. 1917, Lawrence 1028 (US); along Deschutes River, Crook Co., 17 Aug. 1919, Whited 121 (M); along Deschutes River, 5 miles below Bend, 1 Aug. 1920, Peck 9743 (ANS, M); Illahe, 2000 ft. alt., 20 Aug. 1920, Steward 304 (UM); highway, 5 miles south of the Dalles, Wasco Co., 28–30 July 1922, Abrams 9502 (P); Rogue River bar at ferry, Curry Co., 24 Aug. 1924, Peck 13682 (ANS); Alvard, Harney Co., 22 July 1927, Henderson 8844 (CAS); south of Kerby, Josephine Co., 15 Aug. 1928, Gale 373 (ANS, M).

WASHINGTON: Topmist Creek, 1882, Brandegée 532 (C, M); without definite locality, 1889, Vasey 232 (US); near the Columbia River, Klickitat Co., Suksdorf 1679 (C, F, M, US); Coulee City, 31 Aug. 1892, Lake & Hull (M); near Egbert Springs, Douglas Co., 1300 ft. alt., 4 July 1893 Sandberg & Leiberg 378 (ANS, C, CAS, F, M, US); Spokane, Aug. 1893, Piper (M, RM); Spokane, 3 Sept. 1896, Piper (C); Waitsburg, 22 July 1897, Horner 213 (US); grassy slopes, Mitchell Creek, 28 Aug. 1897, Gorman 665 (US); without definite locality, 1897, Sheldon 8182 (US); Leavenworth, Okanogan Co., July 1898, Savage, Cameron & Lenocker (F, M); Parker Bottom, 8 July 1901, Cotton 433 (US); Parker, Yakima Co., 8 July 1901, Cotton 433 (ANS); near Prosser, Yakima Co., 9 Aug. 1902, Cotton 808 (M, RM, US); Spokane, 9 Sept. 1902, Kreager 529 (US); Yakima Ridge, Yakima Co., 18 July 1903, Cotton 1408 (US); near Rockland, Klickitat Co., 3 Aug. 1904, Suksdorf 4075 (F, M, US); Spokane, Spokane Co., 14 Sept. 1912, Turesson (RM); bank of Wenatchee River along railroad west of Leavenworth, 25 Aug. 1918, Otis 845 (CAS); Tumwater Canyon, Chelan Co., 1300 ft. alt., 19 July 1921, Otis 1081 (US); Naches River, 19 Aug. 1923, Nelson 1554 (RM); Wilson Creek, Grant Co., 7 July 1923, Spiegelberg 4 (RM).

CALIFORNIA: Fort Reading, Newberry (US); Indian Valley, Aug., Lemmon (C); Indian Mt., Plumas Co., Lemmon 257 (F); Indian Valley, Patterson (F); Coyote Creek, Santa Clara Co., Smith 3346 (RM); Antelope Hill, Austin 1432 (US); without definite locality, Bridges 116 (US); without definite locality, 1851, Wisselius (M); Fort Miller, July 1853, Heermann (ANS, US); without definite locality, 1860–62, Brewer 2056 (US); near Camp 42, Idria, San Benito Co., 20 July 1861, Brewer 769 (US); Puta Canyon, Yolo Co., 5 Aug. 1862, Brewer 1315 (US); dry creek beds, Lake Co., 20 Sept. 1863, Bolander 2677 (C, US); Santa Barbara Co., 1865, Torrey 140 (US); Mono Lake, 1866, Bolander 6256 (C, F, M, US); near Healdsburg, Sonoma Co., 27 Aug. 1872, Redfield 121 (M); Big Trees of Calaveras, Aug.–Sept. 1872, Torrey (US); Sierra Co., 1874, Lemmon (M); Walkers Basin, 3440 ft. alt., 27 Aug. 1875, Rothrock 281 (F, US); Mendocino Co., 1875, Vasey (F); near Yreka, Siskiyou Co., 16 Aug. 1876, Greene 979 (M); Soda Springs, Plumas Co., July 1875, Austin (US); near Yreka, Siskiyou Co., 16 Aug. 1876,

Greene 979 (F); Yreka plains, 20 Aug. 1880, *Engelmann* (M); San Bernardino Mts., June 1880, *Parish* (M); Cucamonga Mt., San Bernardino Co., July 1882 *Parish & Parish* 159 (ANSP, F, US); gravelly washes of Russian River, Ukiah, 14 Aug. 1882, *Pringle* (ANSP, US); Truckee, Sept. 1887, *Sonne* 426 (ANSP); Hyampom, Humboldt Co., 25 July 1888, *Chestnut & Drew* (C); canyon on San Jacinto Mt., Riverside Co., 28 July 1890, *Gray* 2108 (M); canyon on San Jacinto Mt., 28 July 1890, *Orcutt* 2108 (M); Knight's Ferry, Stanislaus Co., 1890, *Sanford* 173 (C); near Independence, Inyo Co., 14 June 1891, *Coville & Funston* 956 (US); Putah Canyon near Devils Gate, July 1892, *Jepson* (C); near Pomona, 19 Nov. 1892, *Orcutt* 2285 (M); bed of Clear Creek, Horsetown, 14 Sept. 1895, *Ward* 69 (US); Soda Springs, Plumas Co., Aug. 1896, *Austin* 855 (M, US); divide at head of Fandango Valley, 1750 m. alt., 31 July 1896, *Coville & Leiberg* 137 (US); San Antonio Mts., 5800 ft. alt., 8 Aug. 1896, *Hall* (C); southwestern Colorado Desert, San Diego Co., July 1896, *Orcutt* 2118 (US); San Jacinto Valley, June 1897, *Reinhardt* (C); Round Valley, Mendocino Co., 440 m. alt., 20 July-3 Aug. 1897, *Chestnut* 594 (US); Pitt River Canyon, Sonoma Co., 12 July 1898, *Baker* 548 (RM, US); near Sites, Glenn Co., May 1898, *Burtt-Davy* 4278 (C); Santa Lucia Mts., Monterey Co., June 1898, *Plaskett* 165 (US); Mendocino Co., Aug. 1898, *Brown* 925 (ANSP, F, M, RM, US); Monrovia, Los Angeles Co., 9 Aug. 1900, *Abrams* 872 (P); Tehipite Valley, Fresno Co., 4000 ft. alt., 6-10 July 1900, *Hall & Chandler* 502 (C); Hupa Valley, July 1901, *Goddard* 24 (C); Lytle Creek Canyon, San Bernardino Co., 2500 ft. alt., 13 July 1902, *Abrams* 2686 (ANSP, C, M, P, US); near Pomona, Nov. 1902, *Babcock* (C); Redding, Sept. 1902, *Grant* 5276 (C); Warner Mts., 30 July-6 Aug. 1902, *Griffiths & Hunter* 388 (US); Eel River, 1 mile below Hullville, Lake Co., 1 Aug. 1902, *Heller* 6008 (ANSP, F, M, P, RM, US); Welch's Canyon, Eureka Co., 15 Aug. 1902, *Kennedy* 679 (RM); Claremont, Los Angeles Co., 1 Aug. 1902, *Palmer* 3 (C); San Antonio Canyon, near Claremont, Los Angeles Co., 2 Aug. 1903, *Baker* 3452 (C, CAS, F, M, P, RM, US); St. Helena, Sept. 1903, *Dunnoch* (C); vicinity of Ione, 200-500 ft. alt., July 1904, *Brownston* 1123 (ANSP, C, M, US); Nine Mile Creek, Fresno Co., 29 July 1904, *Culbertson* 4681 (C, M, P, US); Forest Home, San Bernardino Co., 5500 ft. alt., Aug. 1904, *Smith* (US); dry beds of streams, San Bernardino Co., 6000 ft. alt., Aug. 1904, *Williamson* (ANSP); Mentone, San Bernardino Co., Aug. 1904, *Smith* 2 (C); Princeton, Colusa Co., 17 Oct. 1905, *Chandler* (C); flood plain, Gurneyville, 30 Aug. 1907, *Coules* 1418 (F); Valley of Van Duzen River, opposite Buck Mt., Humboldt Co., 2500 ft. alt., 27 June-30 July 1908, *Tracy* 2933 (C); Mill Creek, San Bernardino Mts., 6000 ft. alt., 25 July 1909, *Hall* (US); Downieville, 1909, *Kennedy* 47 (CAS); near Yreka, Siskiyou Co., 17 July 1910, *Butler* 1789 (M, P, RM, US); Pitt to Baird, Shasta Co., 25 July 1912, *Eastwood* 1414 (ANSP, CAS); Sison, Siskiyou Co., 20 July 1912, *Eastwood* (CAS); Pitt River, Shasta Co., 8 July 1913, *Smith* 452 (ANSP, CAS); hills, 8 miles north of Oroville, 13 Aug. 1914, *Heller* 11682 (CAS, F, M); Goodwin Ranch, Buckeye Creek, Yolo Co., 25 June 1916, *Stinchfield* 337 (P); Klamath River above mouth of Shasta River, Siskiyou Co., 7 Sept. 1917, *Heller* 12974 (ANSP, CAS, F, M, US); near Livermore, 1 July 1918, *Herrin* (CAS); Yreka, Siskiyou Co., Sept. 1919, *Overmann* (ANSP); lower slopes, San Jacinto Mt., 1800 ft. alt., 9 July 1919, *Spencer* 1266 (CAS, P); near mouth of Mormon Creek, 8000 ft. alt., 28 July 1919, *Williamson* 325 (P, RM); Klamath River at Terwah, Del Norte Co., 9 Sept. 1920, *Duncan* 437 (ANSP, RM); San

Jacinto, June 1921, *Campbell* (CAS); Van Duzen River, on the road, 21 July 1921, *Eastwood* 10667 (CAS); Woodlake, near Exeter, 20 Sept. 1921, *Kelley* (CAS); San Jacinto, 15 July 1921, *Jaeger* 1168 (P, US); near Mono Flat, Santa Barbara Co., 3 July 1923, *Grant* 1680 (M); ridge south of Swartout Valley, Los Angeles Co., 8450 ft. alt., 31 Aug. 1923, *Muns* 7679 (P); Rialto, 19 Aug. 1924, *Jones* (P); dry uplands, Soda Bay, Clear Lake, Lake Co., 22 July 1926, *Blankinship* (CAS); near Pope Valley Creek, southwest Walter's Springs, Napa Range, Napa Co., 24 Aug. 1927, *Howell* 3048 (CAS); Sisquoo River near Santa Maria, Sept. 1927, *Siesheimer* (CAS); Jackrabbit Pass, 6 miles west of Beaumont, 8 June 1928, *Johnson* (CAS); Coyote Creek near Edenvale, Santa Clara Co., 5 Aug. 1928, *Smith* 3246 (M); Chico, Sept. 1928, *Walther* (CAS); Kelseyville, Kelsey Creek, Lake Co., 9 Aug. 1929, *Blankinship* (M); Black Canyon, White Mts., 7000 ft. alt., 6 Aug. 1930, *Duran* 549 (CAS, M); Markleville, Alpine Co., 5300 ft. alt., 7 July 1930, *Rose* (CAS, M); 3 miles east of Jacksonville, Tuolumne Co., 12 Oct. 1931, *Jussel* (CAS, M); Willow Creek, Humboldt Co., 30 June 1931, *Van Dyke* (CAS).

23. *M. Brandegei* Watson in Proc. Am. Acad. 20: 367. 1885; Howell, Fl. N. W. Am. 1: 239. 1897; Urban & Gilg in Nov. Act. Nat. Cur. [Abh. K. Leop.-Carol. Deutsch. Akad. Naturf.] 76: 86. 1900.

Touterea Brandegei (Wats.) Rydb. in Bull. Torr. Bot. Club 30: 276. 1903.

Nuttallia Brandegei (Wats.) Greene, Leaflets Bot. Obs. & Crit. 1: 210. 1906.

Perennial or biennial, from a simple root, 2-3 dm. high; stems erect, yellow or yellowish-white, terete, striate, scabrous, branched; leaves abruptly linear-lanceolate, 2-5 cm. long, deeply sinuate-pinnatifid with linear lobes, scabrous on both surfaces, subcanescent, lower leaves somewhat petiolate, upper sessile; flowers terminating branches, corymbose, 1-3-flowered, sessile, subtended by shortly pedicellate, mostly entire, narrow bracts; calyx-tube subcylindrical, about 10 mm. long, densely hispid; calyx-lobes 30-40 mm. long, densely pubescent; petals 5, pale yellow, lanceolate, 15-20 mm. long, base narrowed, apex acute or acuminate, pilose, otherwise glabrous; stamens 30-35, in 2 series, the outer 5 filaments longer and wider, alternating with the petals, other filaments linear, filiform; style filiform, apex papillose, persistent and withered in fruit; capsule narrowly oblong-cylindrical or subcylindrical, 15-20 mm. long, brownish-black, scabrous; seeds horizontal, flattened, angular, rugose, narrow, scarcely winged margins.

Distribution: sandy places in British Columbia and Washington.

Specimens examined:

BRITISH COLUMBIA: Kamloops, 28 July 1890, Macoun (US); Xero, Ashcroft, 28 June 1907, Cowles 221 (F, M); Spence's Bridge, Thompson River Canyon, 15 Aug. 1931, Howell 7799 (CAS).

WASHINGTON: Walla Walla River, Wilkes Expl. Exp. (US); 1889, Vasey 234 (US); sandy hills near Wenatchee, 30 July 1899, Whited 1172 (US); rocky slopes near Rock Island, Douglas Co., 15 June 1931, Thompson 6754 (M).

24. *M. polita* Nelson in Bot. Gaz. 47: 428. 1909.

Perennial from a semi-woody tap-root; stems 2 to several, slender, erect, 2-4 dm. high, cymosely branched and grayish toward the summit, glabrous and ivory-white below; leaves entire, the lower narrowly spatulate-ob lanceolate, often abruptly acute, sessile to subsessile, intermediate and upper leaves broadest at base, all obscurely papillose and covered with short spine-like barbed hairs; calyx-tube short-turbinate, 5 mm. long; calyx-lobes subulate, divaricate, persistent; petals white, spatulate, 10 mm. long; stamens numerous, the outer filaments dilated-petaloid, antheriferous, shorter than the petals; style short, not cleft at apex; capsule globose, seeds small, obovate-rotund, smooth.

Distribution: open places, hillsides and valleys in Nevada.

Specimens examined:

NEVADA: Candelaria, Esmeralda Co., Shockley 227 (CAS); hillside washes, Las Vegas, 4 May 1905, Goodding 2273 (M, RM TYPE); Muddy Valley, Lincoln Co., 1700 ft. alt., 7 May 1906, Kennedy & Goodding 40 (US).

25. *M. argillosa* Darlington, n. sp.³⁵

Perennial, 2-3 dm. high; stems numerously branched, glabrous, white; leaves sessile, entire, ovate-lanceolate, somewhat spatulate above, 2-2.5 cm. long, attenuated at the base, sca-

"*M. argillosa* Darlington, sp. nov. Planta perennis, 2-3 dm. alta; caulis multum ramosis, glabris, albis; foliis sessilibus, integris, ovato-lanceolatis, supra spatulatis, 2-2.5 cm. longis, ad basem attenuatis, scabris; floribus flavis, parvis, bracteis linearibus integris subtentis; calycis lacinias ovato-lanceolatis, 8 mm. longis, acuminatis, marginibus revolutis; petalis 6-8 mm. longis, obovatis, ad apicem acuminatis; staminibus multis, filamentis exterioribus dilatatis, interioribus linearibus; capsula turbinata, 5-8 mm. longa, scabra, brunnea; seminibus parvis, anguste alatis, brunneo-flavis, punctatis.—Vermillion, Utah, 5600 ft. alt., 16 July 1894, Jones 5631 (M TYPE)."

brous; flowers yellow, small, subtended by linear entire bracts; calyx-lobes ovate-lanceolate, 8 mm. long, acuminate, margins revolute; petals 6-8 mm. long, obovate, apex acuminate; stamens numerous, outer filaments dilated, the inner filaments linear; capsule turbinate, 5-8 mm. long, scabrous, brownish; seeds small, narrowly winged, brownish-yellow, punctate.

Distribution: clay soil, near Vermillion, Utah.

Specimens examined:

UTAH: Vermillion, 5600 ft. alt., 16 July 1894, Jones 5631 (M TYPE).

26. *M. perennis* Wooton in Bull. Torr. Bot. Club 25: 260. 1898; Urban & Gilg in Nov. Act. Nat. Cur. [Abh. K. Leop.-Carol. Deutsch. Akad. Naturf.] 76: 358. 1900.

Hesperaster perennis (Wooton) Cockerell in Torreya 1: 143. 1901.

Touterea perennis (Wooton) Rydb. in Bull. Torr. Bot. Club 30: 277. 1903.

Perennial, 2-3 dm. high; stems caespitose, erect or spreading above, white, terete, scabrous with retrorsely barbed hairs to almost glabrous, bark thin, white; leaves alternate, linear, 3-10 cm. long, 2-3 mm. wide, entire or dentate with about 10 rounded lobes, scabrous with barbed hairs; flowers terminal or in upper axils, and pseudocymose, pedicellate, subtended by small leafy bracts; calyx-tube turbinate, 5 mm. long; calyx-lobes 5, subulate, about 10 mm. long, scabrous, an indurated ring forming at base of segments; petals 10, oblanceolate, acute, 2 cm. long, entire, light lemon-yellow, the 5 outer ones 5 mm. broad, the inner a little narrower; stamens numerous, 5 outer filaments slightly expanded, same length as petals, inner ones shorter; style 1 cm. long, apex minutely papillose; capsule campanulate, cylindric, barely 1 cm. long, 4 mm. in diameter, with persistent calyx-lobes, scabrous; seeds numerous, flattened, elliptic, orbicular, winged.

Distribution: on clayey soils, New Mexico.

Specimens examined:

NEW MEXICO: White Mts., Lincoln Co., 5400 ft. alt., 21 July 1897, Wooton 184 (M, P, RM, US TYPE); along Tularosa Creek, Round Mountain, Otero Co., 1897, Wooton 184 (US); along Tularosa Creek, Round Mountain, Otero Co., 20 Aug. 1899,

Wooton (US); along Tularosa Creek, Round Mountain, Otero Co., 20 July 1905, Wooton (US).

27. *M. humilis* (Gray) Darlington, n. comb.

M. multiflora (Nutt.) Gray var. *humilis* Gray in Smithson.

Contr. [Pl. Wright.] 3: 74. 1852.

M. pumila (Nutt.) Torr. & Gray var. *humilis* (Gray) Urban & Gilg in Nov. Act. Nat. Cur. [Abh. K. Leop.-Carol. Deutsch. Akad. Naturf.] 76: 93. 1900.

Hesperaster multiflorus (Nutt.) Cockerell in Torreya 1: 143. 1901.

Touterea humilis (Gray) Rydb. in Bull. Torr. Bot. Club 30: 277. 1903.

Nuttallia gypsea Wooton & Standley in Contr. U. S. Nat. Herb. [Fl. N. Mex.] 16: 149. 1913.

Nuttallia humilis (Gray) Rydb. in Bull. Torr. Bot. Club 40: 61. 1913.

Acrolasia humilis (Gray) Osterh. in Bull. Torr. Bot. Club 49: 183. 1922.

Perennial, herbaceous, caespitose, 2–4 dm. high; stems leafy, smooth and white below, branched and scabrous toward the apex; leaves green, oblong to oval-oblong, 2–4 cm. long, 1 cm. wide, pinnately divided into linear obtuse segments 1 mm. broad, narrowed, short-petiolate at base, the upper and lower surface covered with scattered recurved stout white barbed glochidiate hairs with bulbiform bases; flowers small, terminal, pedicellate, subtended by 1 or 2 small linear bracts; calyx-tube campanulate, 3–4 mm. long; calyx-lobes ovate-lanceolate, acuminate, later becoming triangular-subulate, 5 mm. long; petals lanceolate, 12–15 mm. long, 2–3 mm. broad, base tapering, apex acute; stamens numerous, the outer series of filaments dilated and petaloid, the inner series shorter; capsule semi-hemispherical, 7 mm. long; seeds numerous, flat, winged, minutely tuberculate.

Distribution: clay cliffs in open places, Colorado and Utah, south to Texas and New Mexico.

Specimens examined:

TEXAS: Odessa, Sept. 1881, Havard (US); Camp Charlotte, 1889, Nealley 703 (154) (F, US).

COLORADO: clay cliffs beyond Muddy River, Middle Park, 27 July 1875, Patterson 41 (F); clay cliffs along Muddy River, Middle Park, 28 June 1876, Patterson (F, M, US); McCoya, along Grand R., July 1891, Eastwood (CAS); Sulphur Springs, Grand Co., 7 Aug. 1907, Osterhout 3562 (RM); Paradox, Montrose Co., 5400 ft. alt., 21 June 1912, Walker 157 (RM, US); West Paradox, Montrose Co., 5200 ft. alt., 22 Aug. 1920, Payson 2323 (CAS, M, RM); western Montrose Co., 5000 ft. alt., 14 July 1924, Payson & Payson 3930 (M, RM).

UTAH: Bennett Spring, May-Oct. 1896, Purpus (C); White River, 6000 ft. alt., 25 May 1908, Jones (P).

NEW MEXICO: "western Texas to El Paso," May-Oct. 1849, Wright 214 (ANSP, US); Gallup, 20 July 1897, Herrick 893 (US); McCarthy Station, 25 July 1889, Munson & Hopkins (US); Arroyo Ranch near Roswell, 1-4 Sept. 1903, Griffiths 5724 (US); north of Gallup, 3 Aug. 1904, Wooton 2800 (US); plains, 35 miles south of Terrence, 6000 ft. alt., 10 Aug. 1909, Wooton (US); Lakewood, 6 Aug. 1909, Wooton (US); Arroyo Ranch near Roswell, June 1914, Griffiths (US).

28. *M. leucophylla* Brandegee in Bot. Gaz. 27: 448. 1889.

Biennial or perennial, 3-4 dm. high; stems several from a small tap-root, clothed with soft white pubescence; basal leaves linear-oblong, 6-8 cm. long, 1 cm. wide, attenuated at both ends, regularly sinuate-dentate, densely clothed on the upper and lower surfaces with short rigid upwardly barbed hairs, and with minute glochidiate hairs along the margin, caudine leaves oblong, 4 cm. long, 1-1.5 cm. wide, rounded at the apex, slightly acute, base cordate-clasping, slightly sinuate-dentate, densely short-hispid; flowers bright yellow, pedicellate, 1-8 mm. long, in a divaricately branched panicle; calyx-lobes triangular-acuminate, obtuse, 6 mm. long; petals broadly spatulate, apex slightly retuse and pubescent, 1 mm. long; outer series of stamens broadly petaloid, somewhat dentate above; capsule 8-10 mm. long and nearly as broad; seeds flat, narrowly margined.

Distribution: on slopes of dry arid canyons, Nevada.

Specimens examined:

NEVADA: Ash Meadows, May-Oct. 1898, Purpus 6032 (ANSP, US TYPE); Sheep Mountain, May-Oct. 1898, Purpus 6144 (C); between Owens and Lee Canyons, Clark Co., 5000 ft. alt., 24 July 1913, Heller 10980^a (ANSP, M).

29. *M. multicaulis* (Osterh.) Nelson in Coulter & Nelson, Man. Bot. Rocky Mts. 326. 1909.

M. pumila (Nutt.) Torrey & Gray var. *multicaulis* (Osterh.) Nelson in Coulter & Nelson, Man. Bot. Rocky Mts. 326. 1909.

Touterea multicaulis Osterh. in Bull. Torr. Bot. Club 30: 236. 1903.

Nuttallia multicaulis (Osterh.) Osterh. in Muhlenbergia 8: 45. 1912.

Perennial, 2-3 dm. high, with numerous stems, much branched; stems whitish, shining, glabrate below, hispid toward the summit; lower leaves short-petiolate, less than 1 cm. long, pinnatifid, the divisions remote and entire, upper leaves narrowly linear, entire, sessile; flowers numerous at apex of branches, opening at sundown and closing in about a half hour, short-pedicelled; calyx-tube 10 mm. long, appressed-hispid; calyx-lobes deltoid, acuminate, about 10 mm. long; petals 5, 1-2 cm. long, golden-yellow, base narrowed into a short claw; stamens numerous, outer series petaloid; capsule hispid, 1-1.5 cm. long; seeds numerous, round, smooth, slightly margined, but not winged.

Distribution: open places, Colorado and northern New Mexico.

Specimens examined:

COLORADO: Wolcott, Eagle Co., 28 July 1898, Shear & Bessey 5290 (US); Wolcott, Eagle Co., 21 June 1900, Osterhout 2113 (P, US); Wolcott, Eagle Co., 17 July 1902, Osterhout 2663 (CAS, P, RM).

NEW MEXICO: Rio de los Frijoles, Aug. 1910, Robbins 8235 (RM).

30. *M. densa* Greene in Pittonia 3: 99. 1896.

M. pumila (Nutt.) Torrey & Gray var. *densa* (Greene) Urban & Gilg in Nov. Act. Nat. Cur. [Abh. K. Leop.-Carol. Deutsch. Akad. Naturf.] 76: 357. 1900.

M. multiflora (Nutt.) Gray var. *densa* (Greene) Nelson in Coulter & Nelson, Man. Bot. Rocky Mts. 325. 1909.

Hesperaster densus (Greene) Cockerell in Torreya 1: 143. 1901.

Touterea densa (Greene) Rydb. in Bull. Torr. Bot. Club 30: 277. 1903.

Nuttallia densa (Greene) Greene in Leaflets Bot. Obs. & Crit. 1: 210. 1906.

Perennial, herbaceous, low, compactly and divaricately branched from the base, 2-3 dm. high, forming a hemispherical tuft; branches white and hispid, short-jointed and flexuous; leaves small, narrowly linear-lanceolate, sinuate-pinnatifid, hispid; flowers solitary or in clusters of 3 at the ends of the

branches, golden-yellow, 3-4 cm. broad; calyx-tube oblong, striate; calyx-lobes linear-subulate, about half the length of the tube; petals 10, subequal, spathulate-lanceolate, acute; seeds round-ovoid, thin, flat, strongly winged.

Distribution: open, sandy places in southern Colorado.

Specimens examined:

COLORADO: Grand Junction, 4500 ft. alt., 21 June 1894, Jones 5472 (C, M, RM, US) and 5492 (M, P); Gunnison Mesa, Grand Junction, 15 May 1916, Eastwood (CAS); Grand Junction, 21 June 1918, Eastwood 7222 (CAS).

31. *M. Torreyi* Gray in Proc. Am. Acad. 10: 72. 1874; Brewer & Watson, Bot. Calif. 1: 237. 1876; Urban & Gilg in Nov. Act. Nat. Cur. [Abh. K. Leop.-Carol. Deutsch. Akad. Naturf.] 76: 38-39. 1900; Wooton & Standley in Contr. U. S. Nat. Herb. [Fl. N. Mex.] 16: 433-434. 1913; Tidestrom in Contr. U. S. Nat. Herb. [Fl. Utah and Nev.] 25: 364. 1925.

M. acerosa Jones, Contr. West. Bot. 17: 30. 1930.

Perennial, caespitose plants, densely and tenaciously hispid, 0.5-1.5 dm. high; root thick, fleshy and straight; stems several, white, sparingly white-pubescent, with short spine-like and a few glochidiate hairs, branching freely, with short internodes, giving a tangled appearance, angled; leaves sessile, thick, 2-5 cm. long, coarsely pinnatifid, cleft at the base into 3, rarely 5, subulate-acuminate divisions, the central division terminating in a short spine, midrib very prominent, margins strongly revolute, pubescent with short stiff hairs; flowers yellow, solitary, axillary, shorter than the leaves; calyx-tube short, oblong, truncate; calyx-lobes 5, cleft below the middle, linear-subulate; petals yellow, spathulate-lanceolate to oblanceolate, 5 mm. long, densely pubescent on the outer surface; stamens about 25-35, all filaments filiform, inner series slightly shorter; style 3-parted, cleft to the middle, not twisted; capsule urceolate, ovate, contracted below the broad summit, 2-3 mm. long; seeds few, about 7-9, 1 mm. long, turgid, pyriform-oblong, pointed at the base, obscurely angled, subrugose, dark, shiny.

Distribution: sterile, saline plains of western United States.

Specimens examined:

IDAHO: Bruneau, 23 June 1930, Jones 25020 (M TYPE of *M. acerosa* Jones).

NEVADA: U. Spring, June 1913, K. Brandegree (C); Muney, 4 July 1891, Jones

(C, CAS, P, RM, US); sterile saline plains, Humboldt Co., 1865, *Torrey* 138 (US TYPE, V); Humboldt Desert, near Deephole Springs, *Lemmon* (C); Pyramid Lake, 1873, *Lemmon* (C); sandy soil, Hot Creek Valley, 3000–4000 ft. alt., May–Oct. 1898, *Purpus* 6349 (US).

CALIFORNIA: without definite locality, 1875, *Lemmon* 113 (US); northern part of volcanic tableland, Crooked Creek, Mono Co., 25 Aug. 1914, *Pearson* 752 (PH); Sherwin Grade, Mono Co., 5500 ft. alt., 27 May 1925, *Feudge* 1561 (P); on slides of fine pumice on the north shore of Mono Lake, Mono Co., 6450 ft. alt., 12 Aug. 1930, *Pearson* 9200 (CAS, P, PH).

32. *M. reflexa* Coville in Proc. Biol. Soc. Wash. 8: 74. 1892; Urban & Gilg in Nov. Act. Nat. Cur. [Abh. K. Leop.-Carol. Deutsch. Akad. Naturf.] 76: 40. 1900; Jepson, Man. Fl. Pl. Calif. 648. 1925.

Annual herbaceous plants, 0.5–2 dm. high, densely hirsute with short stiff barbed glochidiate and spine-like hairs; stems stout, branching diffusely from the base, erect or spreading, brownish-white, longitudinally striate; leaves alternate, linear-ob lanceolate and petiolate below to ovate or slightly hastate, subsessile or sessile above, acute or obtuse at the apex, 2–6 cm. long, irregularly and deeply sinuate-dentate, nerves inconspicuous, upper surface sparsely hirsute with slender stiff spine-like hairs, lower surface densely hirsute with short stiff barbed glochidiate hairs; flowers usually solitary, small, more or less concealed by the leaves, in upper forks of the branches, small, 1–1.5 cm. long, and pedicellate; calyx-tube obovate, 7–10 mm. long, densely hirsute with long, antrorse spine-like and verticillate glochidiate hairs, pedicel 4–5 mm. long; calyx-lobes narrowly subulate, acute at the apex, 6–9 mm. long, densely hirsute with short stiff glochidiate hairs; petals 8, yellow, oblong-ob lanceolate, somewhat acute at the apex, narrowed toward the base, nearly equalling the calyx-lobes in length, barbellate near apex, otherwise glabrous; stamens 9–15, in 2 series, somewhat dilated and abruptly narrowed at apex, 3–5 mm. long, anthers emarginate at base and apex; style stout, nearly as long as the petals, cleft one-third of its length; capsule obovate-oblong, yellowish-brown, crowned by the persistent erect yellowish calyx-lobes, pedicel reflexed at the apex; seeds 10–12, angularly obovate or pyriform, compressed, slightly constricted below the middle with a deep transverse groove on either face, opaque, muriculate.

Distribution: desert ranges in Death Valley, Inyo Co., California.

Specimens examined:

CALIFORNIA: INYO COUNTY: about 8 miles above Furnace Creek Ranch, Furnace Creek Canyon, Funeral Mts., 22 March 1891, Coville & Funston 454 (US); Surprise Canyon, Panamint Mts., 700 m. alt., 21 April 1891, Coville & Funston 709 (US TYPE); Panamint Canyon, 2000 ft. alt., 3 May 1897, Jones (P); Panamint Canyon, 4000 ft. alt., 4 May 1897, Jones (M, P, US); Funeral Mts., Death Valley, 1000 ft. alt., 8 April 1907, Jones (CAS, P); Amargosa Desert, 4000 ft. alt., 27 April 1907, Jones (P); Salt Spring, Death Valley, 17 May 1915, Parish 10063 (C); alluvial fan, 5 miles south of Bradbury Well, Black Mts., 1 April 1928, Howell 3606 (CAS); Kelso, San Bernardino Co., 3000 ft. alt., 2 May 1906, Jones (P); near Barstow, 2300 ft. alt., 1 May 1922, Spencer 1941 (P); open sandy expanse of the Amargosa Wash, 33 miles north of Baker, 1 April 1928, Peirson 7765 (PH); rocky slopes, 10 miles northwest of Biggs, Mohave Desert, 3 April 1928, Munz & Hitchcock 10955 (P); rocky hills, Baker, San Bernardino Co., 920 ft. alt., 24 March 1932, Peirson 9824 (M, PH, UM).

33. *M. albescens* (Gill.) Griseb. in Abh. Ges. Göttingen [Pl. Lorentz.] 19: 102. 1874; Urban & Gilg in Nov. Act. Nat. Cur. [Abh. K. Leop.-Carol. Deutsch. Akad. Naturf.] 76: 91-92. 1900.

M. Wrightii Gray in Mem. Am. Acad. [Pl. Fendl.] 4: 48. 1849.

Bartonia albescens Gill. ex Arn. Edinb. Jour. Nat. & Geogr. Sci. 3: 273. 1831; Sweet, Brit. Fl. Gard. 2: 182. 1833; Hook. & Arn. in Hook. Bot. Misc. 3: 327. 1840.

Bartonia sinuata Presl, Reliq. Haenk. 2: 38. 1835; Gay, Fl. Chile 2: 428. 1846.

Bartonia Wrightii Walp. Ann. 2: 656. 1851-52.

Myriophyllum Wrightii Gray in Hall, Pl. Tex. 9, ex. Wats. Bibl. Index, 391. 1878.

Touterea Wrightii (Gray) Rydb. in Bull. Torr. Bot. Club 30: 276. 1903.

Nuttallia Wrightii (Gray) Greene, Leaflets Bot. Obs. & Crit. 1: 210. 1906.

Nuttallia albescens (Gill. & Arn.) Standley, Jour. Wash. Acad. Sci. 6: 239. 1916.

Biennial from a fusiform root, 4-6 dm. high; stems simple, rarely paniculate, upright, white or grayish-white, striate, hirsute-scabrous; leaves alternate, oblong-lanceolate, 5-7 cm.

long, broadly sinuate-dentate to sinuate-pinnatifid, with 8–10 pairs of coarse, obtuse teeth, the lower leaves narrowed into a petiole, attenuate, the upper leaves with a truncate or subauriculate-dilated base, sessile, ovate-lanceolate or linear-lanceolate, scabrous and canescent on upper and lower surfaces; flowers cymose, terminating the ends of the branches, sessile, small, ochroleucous, subtended by 1–3 linear-subulate bracts 1–1.5 cm. long, at base of calyx-tube; calyx-tube attenuated at base, 10–20 mm. long, 3–4 mm. broad, densely hirsute-scabrous with verticillate-glochidiate hairs intermixed with a few spine-like hairs, brown or brownish-gray; calyx-lobes lanceolate to linear-lanceolate, acuminate, 2–3 mm. long, persistent, reflexed and withered on the fruit, yellowish; petals 5, lanceolate-spathulate, 7–8 mm. long, acute or shortly acuminate at the apex, slightly pilose, otherwise glabrous; stamens 30–40, in 2 series, 5 filaments of outer series petaloid, the other filaments linear-subulate, 4–6 mm. long, anthers not contorted; style about 4 mm. long, filiform, angled, densely papillose at the apex, persistent and withered in fruit; capsule subclavate-cylindrical, 2–2.5 cm. long, yellowish-brown, striate, hirsute-scabrous; seeds 50–60, in 1 or 2 series, oval-orbicular, 3–3.5 mm. long, grayish-mottled, minutely granulate-punctate, winged, membranaceous.

Distribution: dry habitats from Oklahoma southward through Mexico, Chile, and Argentina.

Specimens examined:

OKLAHOMA: vicinity of Fort Sill, 6 June 1916, Clemens 11695 (M).

TEXAS: indefinite locality, Wright (ANSP); river bank, Austin, 16 May 1872, Hall 227 (F, M, US); Austin, 1872, Hall (F, US); Austin, July 1882, Letterman (M, US); Limpia Canyon, 1889, Nealley 156 (F); Del Rio, 13 June 1891, Dewey (US); Fairland-Grant Mt., 17 May 1920, Tharp 841 (US); 15 miles northwest of Fort Davis, Jeff Davis Co., 16 June 1926, Palmer 30976 (M).

MEXICO: Chihuahua, Thurber (US); Mexican Boundary Survey, Valley of Rio Grande, below Donana, Parry, Bigelow, Wright & Schott 389 (US).

CHILE: Aconcagua, ex herb. Philippi (C, US); 1828–34, Gay 357 (US); Riva-davia, Prov. Coquimbo, 800 ft. alt., Nov. 1923, Werdemann 101 (C, F, M); Maipo, 1700 m. alt., 11 Jan. 1924, Bro. Claude-Joseph 2929 (US).

ARGENTINA: Cordoba, Dec. 1891, Kuntze (F); tablelands south of Rafaela, Vallee du Rio Atuel, Prov. Mendoza, Jan.–Feb. 1897, Wilczek 327 (US); vicinity of General Roca, Rio Negro Valley, 250–360 m. alt., Nov. 1914–Feb. 1915, Fischer 61 (F, M,

US); Prov. Cordoba, March 1925, Lossen 293 (F); Rio del Valle, Prov. Cata-marea, 610 m. alt., 20 Aug. 1928, Venturi 6074 (M, US).

34. *M. nuda* (Pursh) Torrey & Gray, Fl. N. Am. 1: 535. 1840; Gray in Mem. Am. Acad [Pl. Fendl.] 4: 47. 1849; in Bost. Jour. Nat. Hist. [Pl. Lindh. pt. 2] 6: 191. 1850; Porter & Coulter, Fl. Colo. 47. 1874; Coulter in Contr. U. S. Nat. Herb. [Fl. Texas] 2: 119. 1891; Wooton & Standley in Contr. U. S. Nat. Herb. [Fl. N. Mex.] 16: 150. 1913.

M. nuda (Pursh) Torrey & Gray α *subpinnatifida* Ktze. Rev. Gen. 1: 251. 1891.

M. nuda (Pursh) Torrey & Gray β *integrifolia* Ktze. *Ibid.*

M. pumila (Nutt.) Torrey & Gray var. *Reverchonii* Urban & Gilg in Nov. Act. Nat. Cur. [Abh. K. Leop.-Carol. Deutsch. Akad. Naturf.] 76: 94. 1900.

Bartonia nuda Pursh, Fl. Am. Sept. 1: 328, and 2: 749. 1814; Nutt. Gen. 1: 299. 1818; DC. Prodr. 3: 340. 1828; Walp. Rep. 2: 224. 1843; Hook. Lond. Jour. Bot. 6: 227. 1847; Bot. Mag. 90: pl. 5483. 1864.

Torreya nuda Eaton, Man. Bot. ed. 7. 560. 1836; Watson, Bibl. Index, 390. 1878.

Touterea nuda Eaton & Wright ex Watson, Bibl. Index, 390. 1878.

Hesperaster nudus (Pursh) Cockerell in Torreya 1: 143. 1901.

Nuttallia nuda (Pursh) Greene, Leaflets Bot. Obs. & Crit. 1: 210. 1906.

Perennial from a fusiform root; stems solitary, erect, 3-5 dm. high, white, terete, striate, scabrous with verticillate, glochidiate hairs, branched above; leaves alternate, lanceolate to linear-lanceolate, 5-7 cm. long, interruptedly pinnatifid or sinuate-dentate with broad teeth, lower leaves petiolate, the intermediate leaves sessile, smaller, all leaves scabrous and subcanescent on the upper and lower surfaces; flowers corymbose, terminal, sessile, in clusters of 1-3; calyx-tube cylindrical, attenuated, 12-18 mm. long, densely hirsute-scabrous, not bracteolate; calyx-lobes lanceolate to ovate-lanceolate, long-acuminate, 15 mm. long, persistent and withered, irregu-

larly reflexed in the fruit, yellowish, prominent mid-nerve; petals 10, yellow, lanceolate to obovate-lanceolate, 2-5 cm. long, glabrous, apex acute; stamens numerous, 100-150, in 4 series, 2-4 cm. long, the 5 outer filaments petaloid and often sterile, other filaments filiform; style shorter, 1-2 cm. long, filiform, angled, densely papillose at the apex, persistent and withered in the fruit; capsule cylindrical, 2-3 cm. long, yellow to yellowish-brown, subligneous, striated; seeds 70-80, in 2 series on each placenta, orbicular-ovate, 3-4 mm. in diameter, brownish, densely granulate-punctate, broadly winged.

Distribution: gravelly and open places of Nebraska, south and westward to Oklahoma, Texas, and Colorado.

Specimens examined:

INDEFINITE LOCALITY: Nuttall (ANSP TYPE); Rocky Mountains, 1888, Vasey (US).

NEBRASKA: Upper Lawrence Fork, 10 Aug. 1891, Rydberg 123b (US).

KANSAS: Coolidge, Aug. 1884, Kellerman (US); Coolidge, 1892, Hitchcock (M); Hamilton Co., 3 July 1893, Thompson 74 (US).

OKLAHOMA: Cimarron Canyon, Neutral Strip, 1 Aug. 1891, Carleton 378 (US); near Hollis, Harmon Co., 22 June 1913, Stevens 1161 (M).

TEXAS: near Dallas, July-Sept., Reverchon 959b (ANSP, F, M); Shackelford Co., Holstein (ANSP); Valley of Rio Grande, below Donana, Parry, Bigelow, Wright & Schott 390 (US); indefinite locality, July 1829, Berlandier 522-590 (ANSP); Upper Arkansas, 21 July 1845, Fremont's Expedition 243 (M); San Antonio, July 1845, without collector (M); "western Texas to El Paso, New Mexico," May-Oct. 1849, Wright 212 (C, US); Cibolo River, Comal Co., July 1849, Lindheimer 815 (ANSP, C, F, M, US); Callahan Co., May 1882, Reverchon 322 (F, US); sandy western plains, Marion Co., June 1885, Reverchon 322 (M); Champion Creek, Aug. 1888, Havard (US); Limpia Canyon, 1889, Nealley 658 (156) (US); Kerrville, Kerr Co., 19-26 June 1894, 1600-2000 ft. alt., Heller 1896 (ANSP, US); San Antonio, 1897, Wilkinson 42 (M); prairies, near Colorado, Mitchell Co., 8 June 1900, Eggert (M); same locality, 9-10 June 1900, Eggert (M); open ground, Sabinal, Uvalde Co., 7 June 1916, Palmer 10092 (M); near San Antonio, 1900-1902, Wilkinson (M); near Bracken, Comal Co., 29 July 1903, Groth 140 (F); Bexar Co., 1903 Jerny (M, US); Amarillo, 7 Aug. 1903, Reverchon (M); Estelline, 25 May 1906, Reverchon (M); Spanish Pass, Kendall Co., 5 July 1911, Clemens & Clemens 540 (CAS, M, P, RM); Bexar Co., 28 June 1919, Schulz 215 (US); below Eldorado, 2410 m. alt., 14 July 1920, Eggleston 16706 (F); Garza Co., June 1925, Ruth 1288 (RM, US).

COLORADO: Huerfano, Aug. 1867, Parry 81 (M).

35. *M. strictissima* (Wooton & Standley) Darlington, n. comb.

Nuttallia strictissima Wooton & Standley in Contr. U. S. Nat. Herb. [Fl. N. Mex.] 16: 150. 1913.

Perennial, 5-7 dm. high; stems strict, simple below, branched above, whitish, scabrous; lower leaves linear-elliptic, acute, scabrous, shallowly dentate, sessile, the upper leaves linear to linear-lanceolate, reduced and bract-like, crowded, mostly entire, attenuated; flowers few, terminal; calyx-lobes narrowly triangular, 10 mm. long, attenuate, thick, scabrous with short, stiff, white hairs; petals 18-22 mm. long, linear-ob lanceolate, acute; stamens numerous, filaments of outer series broad and petaloid; capsules 20 mm. long, 8 mm. broad, cylindric, scabrous; seeds small, margined.

Distribution: rare occurrence in New Mexico.

Specimens examined:

NEW MEXICO: 20 miles south of Roswell, Chaves Co., 3600 ft. alt., Aug. 1900, Earle 317 (M, P, US).

36. *M. multiflora* (Nutt.) Gray in Mem. Am. Acad. [Pl. Fendl.] 4: 48. 1849; Porter & Coulter, Fl. Colo. 47. 1874; Brewer & Watson, Bot. Calif. 1: 235. 1876; Urban & Gilg in Nov. Act. Nat. Cur. [Abh. K. Leop.-Carol. Deutsch. Akad. Naturf.] 76: 94. 1900; Rydb. Fl. Colo. 234. 1906; Coulter & Nelson, Man. Bot. Rocky Mts. 324. 1909; Wooton & Standley in Contr. U. S. Nat. Herb. [Fl. N. Mex.] 19: 436. 1915; Rydb. Fl. Rocky Mts. & Adj. Plains, ed. 2. 574. 1922; Tidestrom in Contr. U. S. Nat. Herb. [Fl. Utah & Nev.] 25: 361. 1925; Jepson, Man. Fl. Pl. Calif. 848. 1925.

M. pumila O. Ktze. Rev. Gen. 1: 251. 1891, not *M. pumila* (Nutt.) Torrey & Gray.

M. pumila (Nutt.) Torrey & Gray var. *multiflora* (Nutt.) Urban & Gilg in Nov. Act. Nat. Cur. [Abh. K. Leop.-Carol. Deutsch. Akad. Naturf.] 76: 93. 1900.

M. aurea Osterh. in Bull. Torr. Bot. Club 28: 644. 1901, not Nutt.

M. speciosa Osterh. Ibid. 689. 1901; Ibid. 30: 276. 1903.

Bartonia pumila Hook. in Lond. Jour. Bot. 6: 227. 1847.

Bartonia multiflora Nuttall in Proc. Acad. Sci. Phila. 4: 23. 1848.

Hesperaster multiflorus (Nutt.) Cockerell in Torreya 1: 143. 1901.

Hesperaster speciosus Osterh. in Bull. Torr. Bot. Club 29: 174. 1902.

Touterea speciosa (Osterh.) Rydb. *Ibid.* 30: 276. 1903.

Touterea multiflora (Nutt.) Rydb. *Ibid.* 277. 1903.

Touterea sinuata Rydb. *Ibid.* 31: 566. 1904.

Nuttallia multiflora (Nutt.) Greene, Leaflets Bot. Obs. & Crit. 1: 210. 1906.

Nuttallia speciosa (Osterh.) Greene, *Ibid.* 1906.

Nuttallia sinuata (Rydb.) Daniels, Fl. Boulder, Colo. 173. 1911.

Nuttallia Springeri Standl. in Proc. Biol. Soc. Wash. 26: 115. 1913.

Nuttallia marginata Osterh. in Bull. Torr. Bot. Club 49: 183. 1922.

Perennial from a stout tap-root, 4–8 dm. high; stems smooth or slightly scabrous below, always pubescent towards ends of the branches, corymbosely branched, yellowish-white; leaves narrowly lanceolate, sinuate, deeply pinnatifid, 5–7.5 cm. long, 1–2 cm. broad, scabrous on upper and lower surfaces with short stiff verticillate glochidiate and antrorse spine-like hairs, sessile; flowers corymbose, terminating the branches, 3–4 in a cluster, subtended by 1, rarely 2, linear revolute bracts; calyx-tube urceolate, brownish, attenuated, 15–16 mm. long, scabrous; calyx-lobes long-subulate, yellowish, partially reflexed, persistent; petals 10, oblong-oval, obtuse at the apex, 15–20 cm. long, yellow, the inner petals smaller; stamens numerous, all antheriferous, filaments filiform, with the outer series slightly longer and somewhat broadened; style elongated, filiform; capsule urceolate, 15–20 mm. long, 6–8 mm. broad, 3- or 4-valved, scabrous with short stiff glochidiate and spine-like hairs, brownish; seeds in a double series on succulent placentae, thickish, with winged margins, pale brown.

Distribution: in sandy, open places from Wyoming to California, south to Texas and Mexico.

Specimens examined:

TEXAS: Gila Valley, Los Hetates, Schott (F); Gallejo Springs, south of El

Paso, 21 Aug. 1846, *Wisilisenus* 134 (M); El Paso, 1851, *Wright* 1082 (ANSP); El Paso, April 1881, *Vasey* (US); Presidio, 8 May 1881, *Havard* (US); El Paso, 1884, *Jones* (P); El Paso, 23 April 1884, *Jones* 3758 (CAS, F, P, RM, US); Amarillo Creek, 29 May 1902, *Reverchon* 3103 (M); 25 miles north of Boquillas, 17 April 1919, *Hanson* 591 (M).

WYOMING: Chugwater, 30 June 1909, *Cary* 348 (US).

COLORADO: near Leadville, *Schedin* & *Schedin* (RM); without definite locality, 1862, *Hall* & *Harbour* 570 (F, M, US); Pike's Peak, 1 Sept. 1878, *Martindale* (ANSP); Ute Pass, above Manitou Springs, 1 Sept. 1881, *Engelmann* (M); Manitou, Aug. 1883, *Fritschy* (M); Larimer Co., 9 July 1884, *Sheldon* 20 (US); Pike's Peak Trail, 13 Aug. 1888, *Holway* (US); near Boulder, 5000 ft. alt., 6 July 1892, *Patterson* 210 (M); Bear Creek Cañon, 6500 ft. alt., 10 Aug. 1892, *Sheldon* 427 (US); Bear Creek Canyon, El Paso Co., 6500 ft. alt., 10 Aug. 1892, *Sheldon* 104 (US); pond border, Buena Vista, 8000 ft. alt., Chaffee Co., *Sheldon* 425 (US); Silver Cliff, July 1895, *Milligan* (US); Ute Pass, 2 July 1896, *Shear* 3692 (US); Cheyenne Canyon, 20 June 1896, *Biltmore Herbarium* 1 220 (M, US); Salida, 19 June 1898, *Baker*, *Earle* & *Tracy* 853 (C, P); Cascade Canyon, 28 July 1900, *Harper* (M); Estes Park, Larimer Co., 18 and 21 July 1900, *Osterhout* 2203 (RM, US); Pike's Peak, 1 Sept. 1901, *Nelson* 8820 (RM); Mesa, Boulder Co., 5700 ft. alt., 19 June 1906, *Daniels* 77 (M); Estes Park, 10 Aug. 1910, *Johnston* 745 (RM); Creede, Mineral Co., 1 Aug. 1911, *Murdock* 4804 (F, M, P, US); Ruxton Creek, 9500 ft. alt., 4 Aug. 1912, *Brumback* & *Davies* 96 (F); near hospital, Boulder, Boulder Co., 8 June 1913, *Vestal* (M); Naturita, 5400 ft. alt., 21 June 1914, *Payson* 332 (F, M, RM); Trinidad, Los Animas Co., 20 July 1918, *Osterhout* 5757 (P); Buena Vista, Chaffee Co., 2410 m. alt., 1-2 Aug. 1919, *Eggleston* 15400 (F); Divide, Cripple Creek, Teller Co., 2800 m. alt., 2 Aug. 1920, *Clokey* 3820 (ANSP, CAS, F, M, P, RM, US); Naturita, western Montrose Co., 5800 ft. alt., 20 June 1924, *Payson* & *Payson* 3862 (M, RM); Pike's Peak, 8800 ft. alt., 14 Aug. 1924, *Bacigalupi* 818 (P); Denver, 27 June 1926, *Benke* 4165 (F); 6 miles west of Dyke, Archuleta Co., 6450 ft. alt., 29 July 1928, *Wolf* 3085 (CAS).

NEW MEXICO: Albuquerque, *Havard* (M); near Galileo, *Bigelow* (US); Albuquerque, 17 July 1846, *Wisilisenus* 18 (M); Santa Fe, June-July 1847, *Fendler* 242 (ANSP, F, M, US); Fort Defiance, 1869, *Palmer* (US); Albuquerque, 5 Sept. 1884, *Jones* (P); Whitewater, Grant Co., 31 May 1892, *Mearns* 69 (US); Albuquerque, 1894, *Herrick* (US); Lorenzo's Springs, 18 miles east of Albuquerque, 14 Sept. 1895, *Mulford* 1233 (M); hills in Santa Fe Co., 7300 ft. alt., 28 May 1897, *Heller* & *Heller* 3778 (M, P, US); Las Cruces, Dona Ana Co., 3900 ft. alt., 23 June 1897, *Wooton* 57 (M, P, RM, US); Gray, Lincoln Co., 6000 ft. alt., 1898, *Skehan* 115 (M, US); Patterson, 15 Aug. 1900, *Wooton* (US); dry canyon, 4600 ft. alt., Otero Co., 7 April-24 May 1902, *Rehn* & *Viereck* (ANSP); Mangas Springs, 19 Aug. 1902, *Wooton* (US); Florita Mts., 5400 ft. alt., 7 Sept. 1903, *Jones* (P); Mimbres River, Black Range, 5500 ft. alt., 1 July 1904, *Metcalfe* 1045 (CAS, F, M, P, US); Hondo Canyon, Lincoln Co., 8200 ft. alt., 10 Aug. 1904, *Bailey* 888 (US); Turner's Ranch, 19 July 1905, *Wooton* (US); Van Patten's, Organ Mts., 9 June 1906, *Standley* (M); Mesilla Valley, Dona Ana Co., 3850 ft. alt., June 1906, *Wooton* & *Standley* (US); Mesilla Valley, Dona Ana Co., 3800 ft. alt., 2 Aug. 1907, *Wooton* (UM); Santa Fe, 6 Aug. 1910, *Wooton* (US); Silver City, 1911, *Beard* (M); vicinity of Raton, Colfax Co., 2100-2380 ft. alt., 21-22 June 1911, *Standley*

6254 (US); vicinity of Raton, 27 Sept. 1913, *Rose & Fitch* 17555 (US); Las Huertas Canyon, Allen's Ranch, Sandia Mts., 19 July 1914, *Ellis* 170 (US); mesa, 2 miles east of Albuquerque, 5000 ft. alt., 1915, *Kammerer* 49 (ANSB, M, US); Lordsburg, 15 May 1919, *Eastwood* 8549 (CAS); vicinity of Las Vegas, San Miguel Co., Sept. 1919, *Anect* 104 (CAS, US); near Albuquerque, Bernalillo Co., 21 June 1926, *Palmer* 31146 (ANSB, M); Sandia Mts., road between Santa Fe and Albuquerque, 16 Oct. 1928, *Eastwood* 15641 (CAS); Carlsbad, 27 April 1929, *Benke* 5096 (M); near highway, 10 miles west of Deming, 4000 ft. alt., 17 June 1930, *Goodman & Hitchcock* 1149 (CAS, M).

UTAH: sandy soil, Moab, 4100 ft. alt., June 1899, *Purpus* 6507 (M, US).

ARIZONA: Billie Williams Mts., 24–25 July 1864, *Anderson* (M); without definite locality, 1873, *Low* (F); near Camp Lowell, 16 May 1881, *Pringle* (F, M); Prescott, May 1883, *Rusby* 612 (US); Beaver Head, 8 Aug. 1883, *Rusby* 613 (F, P, US); Bowie, Sept. 1884, *Jones* (US); Big Bug, 27 July 1891, *Toumey* (US); San Bernardino Ranch, 11 Sept. 1892, *Mearns* 827 (US); Niggerhead Mts., near Monument No. 82, 17 Aug. 1893, *Mearns* 1945 (US); Tucson, 30 June 1894, *Toumey* (US); Prescott, 4 July 1896, *Kuntze* (US); Tucson, 6 May 1896, *Zuck* (F); Tempe, 18 Aug. 1901, *Kearney* 103 (M, US); Santa Rita Mts., 20 Sept.–4 Oct. 1902, *Griffiths & Thornber* 192 (US); Tempe, 18–27 May 1903, *Griffiths* 4326 (US); vicinity of Yuma, 27 April 1905, *Goldman* 1082 (US); ridge west of Chiricahua Mine, Chiricahua Mts., 7000 ft. alt., 10 Nov. 1906, *Blumer* 1509 (F, M, US); Paradise, Chiricahua Mts., 6700 ft. alt., 30 July 1907, *Blumer* 1609 (F, M, US); sand dune, Hopi Mesa, Aug. 1909, *Saunders* (US); Seligman, 10 Aug. 1911, *Wooton* (US); Parker, 6 March 1913, *Wooton* (US); limestone hill above Portal, Cochise Co., Chiricahua National Forest, 1600–1800 m. alt., 26–29 Sept. 1914, *Eggleslon* 10962 (US); trail to Dixie Canyon, Bisbee, 24 May 1915, *Carlson* (CAS, US); Seligman, 22 June 1916, *Eastwood* 5932 (CAS); Kirkland, 1916, *Taylor* 22 (US); Phoenix, 18 April 1917, *Eastwood* 6162 (CAS); 4 miles south of Dos Cabezas, Chiricahua Mts., Cochise Co., 2 July 1919, *Stone* 463 (ANSB); roadside near Tucson, Pima Co., 4 Jan. 1920, *Bartram* 345 (ANSB); near Tucson, 12 Oct. 1925, *Peebles, Harrison & Kearney* 440 (US); near Sacaton, 2 May 1926, *Harrison* 1781 (US); Patagonia Mts., 28 Aug. 1927, *Peebles & Harrison* 4737 (US); Soda Springs, Beaver Creek, 13 miles above Camp Verdi, Yavapai Co., 3600 ft. alt., 30 June 1928, *Wolf* 2415 (CAS); Pinal Mts., 13 Oct. 1929, *Harrison & Kearney* 6364 (US).

CALIFORNIA: McCoy Wash, 300 ft. alt., Colorado Desert, Riverside Co., April 1905, *Hall* 5925 (RM); Kelso, San Bernardino Co., 8 June 1915, *Brandegee* (C); Ford's Well, west of Blythe, 1000 ft. alt., 3 April 1920, *Munz & Harwood* 3580 (M, P, RM); 6 miles north of Blythe, Riverside Co., 400 ft. alt., 22 March 1932, *Peterson* 9809 (M, PH, UM).

MEXICO: Saltillo, 2 June 1848, *Gregg* 102 (M); San Lorenzo de Laguna, 75 miles southwest of Parras, State of Coahuila, 1–10 May 1880, *Palmer* 858 (ANSB); St. Eulalia plains, Chihuahua, 7 Sept. 1885, *Wilkinson* (US); valley near Chihuahua, 30 Aug. 1886, *Pringle* 737 (ANSB, F, M, US); Hermosillo, Sonora, 10 June 1897, *Maltby* 224 (US); Torreon, Coahuila, 13–20 Oct. 1898, *Palmer* 480 (M); near Casas Grandes, State of Chihuahua, 30 Aug. 1899, *Nelson* 6323 (US); Casas Grandes, Chihuahua, 2 June 1899, *Goldman* 451 (US); plains at Montezuma Station, Chihuahua, 5000 ft. alt., 27 Sept. 1902, *Pringle* 9803 (F, M, US); Colonia

Juarez, Sierra Madre Mts., Chihuahua, 5200 ft. alt., 11 Sept. 1903, Jones (P); vicinity of Aldamia, Chihuahua, 15-17 May 1908, Palmer 248 (F, M, US); vicinity of Magdalena, Sonora, 25 April 1910, Rose, Standley & Russell 15085 (US); Arroyo de Las Alamos, El Alamo near Magdalena, Sonora, 17 May 1925, Kennedy 7092 (CAS, M, US); El Alamo Ranch, Magdalena, 25 May 1925, Kennedy (CAS).

37. *M. pumila* (Nutt.) Torrey & Gray, Fl. N. Am. 1: 535. 1840; Urban & Gilg in Nov. Act. Nat. Cur. [Abh. K. Leop.-Carol. Deutsch. Akad. Naturf.] 76: 93. 1900; Rydb. Fl. Colo. 234. 1906; Coulter & Nelson, Man. Bot. Rocky Mts. 324. 1909; Wooton & Standley in Contr. U. S. Nat. Herb. [Fl. New Mex.] 19: 436. 1915; Rydb. Fl. Rocky Mts. & Adj. Plains, ed. 2. 574. 1922; Davidson & Moxley, Fl. South. Calif. 239. 1923; Tidestrom in Contr. U. S. Nat. Herb. [Fl. Utah & Nev.] 25: 361. 1925.

M. Wrightii Porter & Coulter, Fl. Colo. 47. 1874.

M. multiflora (Nutt.) Gray var. Parry in Am. Nat. 9: 271. 1895.

M. pumila (Nutt.) Torr. & Gray, var. *genuina* Urb. & Gilg in Nov. Act. Nat. Cur. [Abh. K. Leop.-Carol. Deutsch. Akad. Naturf.] 76: 93. 1900.

Bartonia pumila Nutt. Gen. N. Am. 1: 299. 1818.

Hesperaster pumilus (Torr. & Gray) Cockerell in Torreya 1: 143. 1901.

Touterea pumila (Nutt.) Rydb. in Bull. Torr. Bot. Club 30: 277. 1903.

Nuttallia pumila (Nutt.) Greene, Leaflets Bot. Obs. & Crit. 1: 210. 1906.

Biennial from a fusiform root; stems tortuous, grayish or yellowish-white, striate, low and stout, most branched toward the summit, pubescent with glochidiate and spine-like hairs; leaves alternate, obovate-lanceolate to linear-lanceolate, 3-10 cm. long, irregularly sinuate-dentate to sinuate-pinnatifid, acute or obtuse at the apex, upper and lower surfaces scabrous with short verticillate glochidiate hairs, lower leaves somewhat petioled, the intermediate leaves sessile with subcordate semi-amplexicaul base; flowers cymose, terminating branches, in clusters of 1-3, small, slightly pedicellate, subtended at base of calyx-tube by 1-2 linear setaceous bracts; calyx-tube subcylindrical or clavate, 5-15 mm. long, attenuated, hirsute, sca-

brous; calyx-lobes ovate-oblong, long-acuminate, lanceolate to linear-lanceolate, yellowish, persistent and withered in fruit, reflexed; petals 10, yellow, obovate to lanceolate, unguiculate, acute or obtuse at the apex, 9–15 mm. long, apex sparsely pilose, otherwise glabrous; filaments 60–120, in 3 to 4 series, outer series broadened and longer, the other series linear; style filiform, angled, persistent in fruit, apex papillose; capsule subcylindrical, oblong or clavate, attenuate, obtuse or rotund at the base, 15–20 mm. long, brownish-yellow to brownish-black, scabrous, striate; seeds in 2, rarely 1, rows, mottled brown, minutely punctate-granulate, broadly winged.

Distribution: prairies and slopes, Wyoming and Utah, south to Texas and Arizona.

Specimens examined:

INDEFINITE LOCALITY: Ham's Fork of the Colorado of the West, Nuttall (ANSP TYPE).

TEXAS: flats north of Van Horn, El Paso Co., 9 July 1900, Eggert (M); prairies north of Sierra Blanca, El Paso Co., 12 July 1900, Eggert (M); flats north of Van Horn, El Paso Co., 13 May 1901, Eggert (M).

COLORADO: Montrose, 21 July 1897, Shear 4810 (US).

NEW MEXICO: indefinite locality, 1851, Wright 1082 (US); arroyo south of San Marcial, Socorro Co., 22 June 1921, Ferris & Duncan 2338 (CAS, M).

UTAH: indefinite locality, Ward (ANSP); near Glenwood, 5000 ft. alt., 4 June 1875, Ward 164 (ANSP, M, US); Green River, 21 June 1879, Jones (P); sands near Green River, 4500 ft. alt., 12 June 1901, Stokes (US).

ARIZONA: indefinite locality, Voth 17 (F); 12 miles below Black Falls, Little Colorado, 15 May 1901, Ward (US); Yuma, 25 April 1906, Jones (P); top of Sunset Mountain, Coconino National Forest and vicinity, 8000 ft. alt., 25 Aug. 1908, Pearson 39 (US); Flagstaff, 7000 ft. alt., 31 Aug. 1923, Hanson & Hanson 932 (M); slope of Sunset Mountain, 4 July 1923, Hanson & Hanson 616 (M, RM).

WYOMING: dry places, North Fork Wind River, 16 July 1882, Forwood (US); Big Wind River, 5 Aug. 1894, Nelson 3989 (RM).

37a. *M. pumila* (Nutt.) Torrey & Gray var. *procera* (Wooton & Standley) Darlington, n. comb.

Nuttallia procera Wooton & Standley in Contr. U. S. Nat. Herb. [Fl. New Mex.] 16: 150. 1913.

Perennial, slender, 6–10 dm. high; stems strict, sometimes branching at the base, white, the epidermis papery, smooth except on young stems; leaves small, sessile, oblong, obtuse, 3–5 cm. long, about 0.5 cm. broad, with 5–10 coarse rounded teeth on each side, scabrous with short stout white barbed hairs; flowers small on slender terminal peduncles; calyx-lobes nar-

rowly lanceolate, abruptly acuminate; petals bright yellow, oblanceolate, acute, 1 cm. long; outer series of filaments petaloid, narrower than the petals, short-acuminate; capsule oblong-cylindric, 10–12 mm. long, 6–7 mm. in diameter; seeds numerous, disk-shaped, white, tuberculate, surrounded by a broad white wing.

Distribution: Utah and Nevada, south to western Texas and northern Mexico.

Specimens examined:

TEXAS: Frenton, April 1852, Parry (M); Cibold Creek, July 1852, Parry (M); El Paso, 25 June 1891, Evans (M); Altura Park, Franklin Mts., 10 July 1911, Barlow (F); Canutillo, Franklin Mts., 21 July 1911, Barlow (F); El Paso, 4 Aug. 1920, Schulz 227 (US); 4 miles west of Sierra Blanca, Hudspeth Co., 4 July 1921, Ferris & Duncan 2482 (CAS); Indian Hot Springs, 30 April 1930, Jones 25662 (M); mesa, north of Chisos Mts., Brewster Co., 1370 m. alt., 27 June 1931, Moore & Steyermark 5275 (M).

NEW MEXICO: Bloomfield, San Juan Co., Waring 26 (ANSB); White Sands, Dona Ana Co., 3600 ft. alt., 21 June 1895, Wooton (US); White Mts., Lincoln Co., 24 Aug. 1897, Wooton 567 (M, US); White Sands, Dona Ana Co., 4000 ft. alt., 17 July 1897, Wooton 571 (US); Albuquerque, 1900, Harward 20 (M, US); White Sands, Otero Co., 20 July 1901, Wooton (US); Lake Valley, 28 Aug. 1903, Diehl 685 (P); Lake Valley, 28 Aug. 1903, Diehl 680 (P); White Sands, Otero Co., 31 Aug. 1904, Wooton (US); Meailla Valley, Dona Ana Co., 3800 ft. alt., 2 Aug. 1907, Wooton (US); Navajo Indian Reservation, vicinity of Shiprock Agency, 1425 m. alt., 25 July 1911, Standley 7272 (US); mesa, at Huecos, 25 Aug. 1911, Barlow (F); plains southeast of Carlsbad, 12–20 Aug. 1924, Standley 40331 (US); 27 miles south of Animas, Animas Valley, Hidalgo Co., 4640 ft. alt., July 1928, Wolf 2588 (CAS).

UTAH: Sierra La Sal, May–Oct. 1900, Purpus 8091 (C, M, US).

NEVADA: washes, Pioche, 3000–4000 ft. alt., May–Oct. 1898, Purpus 6269 (US); Pioche, Aug. 31, 1912, Jones (P).

ARIZONA: Little Colorado, 9 June 1890, Jones (P); St. Joe, 20 July 1892, Wooton (US); Piney Creek, Chiricahua Mts., Aug. 1896, Fernow (US); Holbrook, 28 June 1896, Zuck (F, M); Holbrook, 31 July 1896, Zuck (US); indefinite locality, Aug.–Sept. 1896, Hough 19 (US); Flagstaff, May–Oct. 1900, Purpus 8071 (C); near Walnut Canyon on slopes, 1700 m. alt., 1 Aug. 1901, Leiberg 5798 (US); Adamana to Navajo, 12 Sept.–18 Oct. 1903, Griffiths 5792 (M, US); Adamana to "Long H" Ranch, 6–15 Aug. 1903, Griffiths 5170 (US); Yuma, 6 Nov. 1909, Mowry (US); Adamana, 27 June 1913, Hitchcock 16½ (US); Adamana, 27 June 1913, Hitchcock 9 (US); Yuma, 21 April 1913, Wooton (US); 3 miles north of Fort Whipple, 5000 ft. alt., 9 July 1916, Taylor 44 (US); Yuma, 22 April 1917, Eastwood 6387 (CAS); Yuma, 22 April 1917, Eastwood 6344 (CAS); Winona, 6400 ft. alt., 16 July 1917, Goldman 2857 (US); Yuma, 10 April 1922, McQuarrie (CAS); near Cameron, 5000 ft. alt., 29 July 1922, Hanson A149 (M, P); between Jacob's Pool and Horserock, 13 July 1926, Jaeger (P); near Yuma, 10 Oct. 1927, Peebles, Harrison & Kearney 4955 (US).

MEXICO: San Lorenzo, States of Coahuila and Nuevo Leon, Feb.–Oct. 1880, Palmer 559 (F, US); near Saltillo, State of Coahuila, 5300 ft. alt., 15–30 April 1898, Palmer 45 (C, F, M, US); Cerro de Cypriano, Coahuila, June 1910, Purpus 4535 (F, M, US).

38. *M. chrysanthra* Engelm. ex Brandegee in Bull. U. S. Geol. Surv. Terr. [Fl. Southwest. Colo.] 2: 237. 1876; Rydb. Fl. Colo. 235. 1906. Coulter & Nelson, Man. Bot. Rocky Mts. 325. 1909; Rydb. Fl. Rocky Mts. & Adj. Plains, ed. 2. 572. 1922.

Hesperaster chrysanthus (Engelm.) Cockerell in Torreya 1: 143. 1901.

Touterea chrysanthra (Engelm.) Rydb. in Bull. Torr. Bot. Club 30: 277. 1903.

Nuttallia chrysanthra Greene, Leaflets Bot. Obs. & Crit. 1: 210. 1906.

Biennial; stems 3–6 dm. high, branched, decumbent toward base, mostly smooth; leaves ovate-lanceolate, 2–7 cm. long, sinuate-dentate, lower leaves narrowed toward the base, upper ones sessile, often entire; flowers subsessile, subtended by bracts; petals 10, 15–20 mm. long, the inner 5 petals smaller and often antheriferous; capsule 2.5–3 cm. long; seeds narrowly margined but not winged, surface rough.

Distribution: southern Wyoming and Colorado, probably also in Utah.

Specimens examined:

WYOMING: Laramie, 10 Aug. 1895, Nelson 1662 (C, RM); Laramie, 19 July 1900, Nelson 7634 (M, P, RM, US); near Jelm, 12 Aug. 1900, Nelson 8066 (RM); near Pine Bluffs, 12 Aug. 1917, Nelson 9798 (M).

COLORADO: Canyon City, 15 Sept. 1873, Brandegee 842 (M); Fremont Co., 1874, Brandegee (M); limestone hills at Canyon City, 26 Sept. 1874, Engelmann (M); Canyon City, Oct. 1875, Brandegee (M); Ute Pass, Manitou Springs, 3 Sept. 1881, Engelmann (M); Pike's Peak, 1890, Carleton (F); Manitou, 16 Aug. 1901, Clements 37 (M, RM, US); north of Florence, Fremont Co., 1 Sept. 1921, Clokey 4214 (ANSP, CAS, F, M, P, RM, US).

39. *M. Rusbyi* Wooton in Bull. Torr. Bot. Club 25: 261. 1898; Wooton & Standley in Contr. U. S. Nat. Herb. [Fl. N. Mex.] 19: 434. 1915.

M. pumila (Nutt.) Torrey & Gray var. *Rusbyi* Urban & Gilg in Nov. Act. Nat. Cur. [Abh. K. Leop.-Carol. Deutsch. Akad. Naturf.] 76: 358. 1900.

Hesperaster Rusbyi (Wooton) Cockerell in Torreya 1: 143. 1901.

Touterea Rusbyi (Wooton) Rydb. in Bull. Torr. Bot. Club 30: 276. 1903.

Nuttallia Rusbyi (Wooton) Rydb. *Ibid.* 40: 61. 1913.

Nuttallia hastata Osterh. *Ibid.* 46: 53. 1919.

Biennial, 8–15 dm. high, branched above; stems erect, stout, scabrous, later becoming glabrous, yellowish-white; lower leaves long, linear-lanceolate, 10–20 cm. long, 1.5–2 cm. broad, attenuated into a petiole, the upper leaves oblong-lanceolate, 4–10 cm. long, sessile, acuminate, sinuate-dentate with a few large sharp teeth, the upper and lower surfaces of leaves rough with barbed hairs; flowers in terminal crowded cymes; calyx-tube clavate, 8–10 mm. long, subtended by two pinnatifid bracts at its base; calyx-lobes narrowly lanceolate, acuminate, 10–12 mm. long; petals 10, light yellow, the outer five narrowly obovate to oblanceolate, acute, 16–20 mm. long, the inner five petals narrower and shorter, often bearing rudimentary anthers at the apex; stamens numerous, 6–12 mm. long, few of the outer filaments slightly dilated; style 1 cm. long, 3-cleft at apex; capsule clavate-cylindric, 3 cm. long, 1 cm. in diameter, striated, scabrous, dark brown; seeds numerous, flattened, ovate, winged.

Distribution: moist slopes of Wyoming southward to New Mexico and Arizona.

Specimens examined:

WYOMING: Cummins, 28–29 July 1895, Nelson 1470 (M, P, RM, US).

COLORADO: Salida, 14 June 1870, Bodin (RM); indefinite locality, Sept. 1875, Brandegee 1243 (C, M); Middle Park, 27 July 1875, Patterson (F); Le Late, Aug. 1875, Brandegee 1282 (M); Hot Springs Canyon, 12 Sept. 1881, Engelmann (M); Dixon Canyon, 31 May 1890, Crandall 138 (US); Wagon Wheel Gap, Aug. 1890, Smith (ANSP); Durango, July 1890, Eastwood (CAS); Durango, 1 Aug. 1896, Tweedy 590 (US); Durango, 18–25 July 1898, Baker, Earle & Tracy 482 (C, CAS, F, M, P, RM, US); Arboles, June 1899, Baker 471 (M, P, RM, US); North Park, 6 Sept. 1900, Osterhout 2263 (P, US); Wolcott, Eagle Co., 21 June 1900, Osterhout 2110 (RM, US); Jelm, Albany Co., 12 Aug. 1900, Nelson 8069 (M, P, RM, US); Black Canyon, 8 July 1901, Baker 370 (M, P, US); Wolcott, 11 July 1902, Osterhout 2664 (P, RM); near Bayfield, 12 Aug. 1904, Wooton (US); near Floressant, 1–8 Aug. 1905, Romaley 1397 (RM); Wagon Wheel Gap, 30 July 1911, Murdock 4771 (CAS, F, M, P, US); Iron Springs, Mesa, 21 Aug. 1912, Walker 525 (RM, US); Colton, 14 Aug. 1915, Drushel (M); Placerville, 23 July

1917, Payson 1094 (M, RM); Walden, 6 Aug. 1918, Osterhout 5796 (P, RM); Piedra, Sept. 1924, Schmoll 1488 (RM); near Dyke, 29 July 1928, Wolf 3084 (CAS); between Trinidad and Morley, 29 July 1929, Mathias 489 (M).

NEW MEXICO: Near Mori River, 17 Aug. 1847, Fendler 243 (M); Gilmore's Ranch, White Mts., 14 July 1895, Wooton (US); White Mts., Lincoln Co., 6300 ft. alt., 25 July 1897, Wooton 210 (M, P, RM, US TYPE); Mogollon Mts., Socorro Co., 5 Aug. 1900, Wooton (US); Sacramento Mts., Fresnal, Otero Co., 27 Aug. 1901, Wooton (P, RM, US); Mogollon Mts., 9 Aug. 1903, Metcalfe 450 (M, P, RM, US); Farmington, 8 Aug. 1904, Wooton (US); White Mts., Lincoln Co., 21 July 1905, Wooton (US); Wheeler's Ranch, 11 July 1906, Wooton (US); White Mts., Lincoln Co., 25 Aug. 1907, Wooton & Standley 3445 (US); Pecos National Forest, 19 July 1908, Standley 4400 (US); Mora, 11 Aug. 1910, Wooton (US); near Dulce, 19 Aug. 1911, Standley 8094 (US); Vermejo Park, Colfax Co., 31 Aug. 1913, Wooton (US); near Ute Park, Colfax Co., 27 Aug. 1916, Standley 13906 (US).

ARIZONA: Bellemont, 2 Sept. 1883, Busby 614 (ANSP); Walker Lake, San Francisco Mts., 17 Sept. 1889, Knowlton 286 (US); Nagle's Ranch, 17-18 Sept. 1894, Jones 6054 (M, P, US); east of San Francisco Peaks, 1 Aug. 1901, Leiberg 5806 (US); Flagstaff to Mogollon Mts., 8-25 July 1903, Griffiths 4964 (US); Flagstaff, 4 Aug. 1922, Hanson 150 (F, M); Coconino Plateau, 29 July 1926, Taylor (CAS).

40. *M. laciniata* (Rydb.) Darlington, n. comb.

Touterea laciniata Rydb. in Bull. Torr. Bot. Club 31: 565. 1904.

Nuttallia laciniata (Rydb.) Wooton & Standley in Contr. U. S. Nat. Herb. 16: 150. 1913.

Biennial or perennial, 3-4 dm. high; stems strict, white, puberulent, branched above; leaves narrowly lanceolate, 5-12 cm. long, deeply pinnatifid to near the midrib, the sinuses rounded or semi-rhombic, lobes oblong to lanceolate, obtuse; flowers terminal, subtended by 1-2 lacinate bracts; calyx-lobes 10 mm. long, lanceolate, apex subulate, soon reflexed; petals golden-yellow, oblanceolate, 15-20 mm. long, base narrowed, apex acute; outer series of stamens petaloid, the other filaments filiform and three-fourths the length of petals; capsule urceolate, 15-20 mm. long, 6-8 mm. broad, scabrous with short, glochidiate and spine-like hairs, brownish; seeds thickish, with winged margins, pale brown.

Distribution: dry hillsides of Colorado and New Mexico.

Specimens examined:

COLORADO: Antonito, 19 July 1898, Earle 19 (M); Durango, 18 July 1898, Baker, Earle & Tracy 496 (F, M, P, US); Pagosa Springs, 7000 ft. alt., July 1899, Baker 470 (F, M, P, RM, US); San Acacio, Costilla Co., 7737 ft. alt., 15 July 1912, War-

ren 36 (RM); Divide, Cripple Creek, Teller Co., 2800 ft. alt., 2 Aug. 1920, *Clokey 3890* (UM); Ridgway, Ouray Co., 7500 ft. alt., 20 Aug. 1920, *Payson & Payson 2309* (CAS, M, RM); Ridgway, Ouray Co., 17 June 1924, *Payson & Payson 3831* (M, RM).

NEW MEXICO: Gallup, 10 June 1916, *Eastwood 5633* (CAS); 8 miles south of Conjilon, Rio Arriba Co., 6630 ft. alt., 24 July 1928, *Wolf 2908* (CAS).

41. *M. pterosperma* Eastw. in Proc. Cal. Acad. Sci. II. 6: 290. 1896; Urban & Gilg in Nov. Act. Nat. Cur. [Abh. K. Leop.-Carol. Deutsch. Akad. Naturf.] 76: 356-357. 1900.

Touterea pterosperma (Eastw.) Rydb. in Bull. Torr. Bot. Club 30: 276. 1903.

Nuttallia pterosperma (Eastw.) Greene, Leaflets Bot. Obs. & Crit. 1: 210. 1906.

Annual, from a fusiform root, 1-2 dm. high, divaricately branched; stems erect, white, shreddy, covered with barbed hairs; lower leaves petiolate, spatulate, often orbicular, 15-20 cm. long, sinuate-dentate, rarely entire, upper leaves sessile, broad at base, 3 cm. long, 2 cm. wide, not uniform in shape or size; flowers at ends of branches, pedicelled, bracted; calyx-tube campanulate, attenuate, about 6 mm. long, 4 mm. broad, densely pubescent; calyx-lobes triangular, acuminate, 6 mm. long, pubescent on outer surfaces, almost glabrous on inner surface; petals lanceolate, 15 mm. long, 4 mm. wide, obtuse; filaments 30-40, in 2 or 3 series, interior filiform, outer series petaloid, anthers minutely scabrous; style filiform, glabrous, angled; capsule campanulate-cylindrical, rotund at base, 10-15 mm. long, 7-8 mm. broad, splitting irregularly; seeds 4 mm. in diameter, in 2 series, oval-rotund, winged with broad circular wings, yellowish-white, covered with minute white dots.

Distribution: mesas in Colorado and Utah.

Specimens examined:

COLORADO: dry mesas, Hotchkiss, 30 June 1892, *Cowen* (US); Grand Junction, May 1892, *Eastwood* (CAS); Gunnison Mesa, Grand Junction, 15 May 1916, *Eastwood 5098* (CAS).

UTAH: 1872, *Bishop* (US); Moab, 26 May 1892, *Eastwood* (CAS); Willows Creek, San Juan Co., 14 July 1895, *Eastwood 31* (CAS TYPE); Green River, 26 June 1899, *Jones* (P).

42. *M. integra* (Jones) Tidestrom in Contr. U. S. Nat. Herb. [Fl. Utah and Nev.] 25: 362. 1925.

M. multiflora (Nutt.) Gray var. *integra* Jones in Proc. Cal. Acad. Sci. II. 5: 689. 1895.

Touterea integra Rydb. Fl. Colo. 235. 1906.

Nuttallia integra (Jones) Rydb. in Bull. Torr. Bot. Club 40: 61. 1913.

Nuttallia lobata Rydb. *Ibid.*

Perennial from a thick root, 3-4 dm. high; stems strict, pubescent, later becoming almost entirely glabrous, shining white; leaves 5-8 cm. long, oblanceolate to ovate-lanceolate above, mostly entire, rarely simply toothed or triangularly lobed; flowers terminal, subtended by narrowly linear bracts; calyx-lobes lanceolate, acuminate, 8-10 mm. long; petals golden-yellow, spatulate, obtuse, 12-18 mm. long; petaloid staminodia similar and almost equal in size to the petals; filaments numerous in several series, outer series dilated; capsule 15 mm. long, 8-9 mm. broad, acute, turbinate base; seeds large, orbicular, broadly winged.

Distribution: dry hills and mesas, from southern Utah to northern Arizona and northwestern New Mexico.

Specimens examined:

UTAH: near St. George, 1874, Parry 76 (ANSP, F, M); St. George, 13 May 1902, Goodding 776 (M); Leeds, 1020 m. alt., 9 May 1919, Tidestrom 9386 (M, US).

ARIZONA: Virgin River, 2000-3000 ft. alt., May-Oct. 1898, Purpus 6192 (M, US).

43. *M. oreophila* Darlington, n. sp.³⁶

Perennial, 2-3 dm. high; stems branched, white, finely pubescent; leaves lanceolate below to ovate-lanceolate above, attenuated below, acuminate at the apex, 3-6 cm. long, coarsely dentate, scabrous, light green, canescent; flowers few, at the

**M. oreophila* Darlington, sp. nov. *Planta perennis, 2-3 dm. alta; caulis ramosis, albis, minute pubescentibus; foliis inferioribus lanceolatis, superioribus ovato-lanceolatis, 3-6 cm. longis, ad basem attenuatis, ad apicem acuminatis, grosse dentatis, sebris, pallide viridibus, canescensibus; floribus paucis ad terminos ramorum, flavis, bracteis integris lanceolatis subtentis; calycis lobis ovatis, acuminatis, flavis, in fructu reflexis; petalis obovatis, obtusis, 10-12 mm. longis; filamentis exterioribus petaloideis, interioribus linearibus; capsula turbinata, 8-10 mm. longa, breve pedicellata, brunneo-nigra, hirsuto-sebra; seminibus late alatis, pallide brunneis, punctatis.—Argus Mts., California, 5000 ft. alt., 11 May 1897, Jones (M TYPE).*

ends of the branches, yellow, subtended by entire lanceolate bracts; calyx-lobes ovate, acuminate, yellow, reflexed on the fruit; petals obovate, obtuse, 10–12 mm. long; outer filaments petaloid, inner filaments linear; capsule turbinate, 8–10 mm. long, shortly pedicellate, brownish-black, hirsute-scabrous; seeds broadly winged, light brown, punctate.

Distribution: mountainous regions of Inyo County, California.

Specimens examined:

CALIFORNIA: Argus Mts., 5000 ft. alt., 11 May 1897, Jones (M TYPE).

44. *M. longiloba* Darlington, n. sp.³⁷

Perennial from a stout root, 1–2 dm. high; stems and branches white or yellowish, scabrous at first, later becoming almost glabrous, exfoliating below; leaves few, sessile, long-attenuated below, lanceolate to ovate-lanceolate, 2–6 cm. long, upper leaves smaller, irregularly sinuate-dentate, scabrous; flowers at the ends of the branches, subtended by linear bracts; calyx-lobes ovate-lanceolate, 9–11 mm. long, persistent and reflexed on the fruit; petals yellow, 10–12 mm. long, narrowly obovate; stamens numerous, outer series of filaments dilated, the inner filaments linear; capsule oblong-rotund, 8–10 mm. long, pedicellate, hirsute-scabrous, pale yellowish or nearly white at maturity; seeds numerous, broadly winged, minutely punctate.

Distribution: Utah and California.

Specimens examined:

UTAH: Moab, 30 Aug. 1891, Jones (P).

CALIFORNIA: "Hayfields," 15 Sept. 1931, Jones (M TYPE); north Fork of Hansupah Canyon, Panamint Mts., 6000 ft. alt., 7 May 1932, Peirson 00 (M, PH);

³⁷ *M. longiloba* Darlington, sp. nov. Planta perennis, radice crassa, 1–2 dm. alta; caulis et ramis albis vel flavis, primo scabris, deinde paene glabris, ad basem exfoliantibus; foliis paucis, sessilibus, inferioribus longe attenuatis, lanceolatis vel ovato-lanceolatis, 2–6 cm. longis, superioribus parvioribus, inaequaliter sinuato-dentatis, scabris; floribus ad terminos ramorum, bracteis linearibus subtensis; calycis lobis ovato-lanceolatis, 9–11 mm. longis, in fructu persistentibus reflexisque; petalis flavis, 10–12 mm. longis, anguste obovatis; staminibus numerosis, filamentis exterioribus dilatatis, interioribus linearibus; capsula oblongo-rotundata, 8–10 mm. longa, pedicellata, hirsuto-seabra, ad maturitatem pallide flava aut paene alba; seminibus numerosis, late alatis, minute punctatis.—"Hayfields," California, 15 Sept. 1931, Jones (M TYPE).

2 miles east of Darwin, Inyo Co., 4500 ft. alt., 6 May 1932, Peirson 9894 (M, PH, UM).

45. *M. puberula* Darlington, n. sp.³⁸

Perennial, 1.5 dm. high; stems and branches somewhat decumbent, white, scabrous, long ovate-lanceolate; leaves 3–5 cm. long, coarsely dentate; flowers yellow, at the ends of the branches, subtended by one linear bract; calyx-lobes persistent, revolute, lanceolate, 6–8 mm. long; petals narrowly obovate, 8–10 mm. long, apex obtuse, base unguiculate; outer stamens petaloid, inner filaments linear; capsule turbinate, 9–10 mm. long, pedicellate, scabrous; seeds light brown, broadly winged, slightly punctate.

Distribution: southern California and adjacent Arizona.

Specimens examined:

CALIFORNIA: Kane Springs, Ord Mts., San Bernardino Co., 1 May 1906, Hall & Chandler 6824 (C TYPE, M photograph).

ARIZONA: Gila Mts., Yuma Co., 28 March 1932, Harrison & Kearney 8410 (M, US).

46. *M. lutea* Greene in Pittonia 3: 99. 1896.

Touterea lutea (Greene) Rydb. Fl. Colo. 235. 1906.

Nuttallia lutea Greene, Leaflets Bot. Obs. & Crit. 1: 210. 1906.

Biennial, from a slender fusiform fleshy root; stems 4–6 dm. high, branched above; basal leaves thickened, sinuate-pinnatifid, upper leaves large, sinuate-dentate; flowers small, deep greenish-yellow; petals 10, acute, elliptical, narrowed at base into a ligulate claw, the inner petals shorter than the outer, stamens numerous, style exceeding the stamens; capsule thick-walled, not striate; seeds oval, flattened, irregularly angled, with a thin winged margin.

Distribution: alkaline soil near Canyon City, Colorado.

**M. puberula* Darlington, sp. nov. Planta perennis, 1.5 dm. alta; caulis et ramis decumbentibus, albis, scabris, longo-ovato-lanceolatis; foliis 3–5 cm. longis, grosse dentatis; floribus flavis ad terminos ramorum, uno bracteo lineare subtentis; calycis lobis persistentibus, revolutis, lanceolatis, 6–8 mm. longis; petalis anguste obovatis, 8–10 mm. longis, apice obtusis, base unguiculatis; staminibus exterioribus petaloideis, interioribus linearibus; capsula turbinata, 9–10 mm. longa, pedicellata, sebra; seminibus pallide brunneis, late alatis, paulo punctatis.—Kane Springs, Ord Mts., San Bernardino Co., California, 1 May 1906, Hall & Chandler 6824 (C TYPE, M photograph).

Specimens examined:

NOTE: No authentic specimens of this species have been seen. However, due to the unusual color of the flowers, it has been maintained as a possible species. Urban and Gilg reduced it to synonymy under *M. pumila* to which it may be found to belong when additional material is available for study.

SECTION III. TRACHYPHYTUM Torrey & Gray

Section III. TRACHYPHYTUM Torrey & Gray, Fl. N. Am. 1: 533. 1840; Walpers, Rep. 2: 224. 1843; Brewer & Watson, Bot. Calif. 1: 235. 1876; Urban & Gilg in Engl. & Prantl, Nat. Pflanzenfam. 3^{te}: 110. 1894; in Nov. Act. Nat. Cur. [Abh. K. Leop.-Carol. Deutsch. Akad. Naturf.] 76: 25. 1900.

Annuals; stems glabrous or pubescent, usually white, rarely yellowish; leaves sessile, sinuate-dentate to pinnatifid, rarely entire; flowers mostly small, in terminal cymes; petals 5, yellow or white, rarely deep yellow with vermillion base; filaments all filiform, or the outer 5 dilated, few to numerous; capsule linear-cylindrical, attenuated, sessile; placentae narrowly filiform; seeds 10–40, in 1 series, pendulous, irregularly angled, somewhat cubical, ovate to subglobose, opaque, minutely tuberculate or muriculate, not winged. Spp. 47–58.

KEY TO THE SPECIES OF SECTION TRACHYPHYTUM

- A. Stems densely scabrous.
- B. Flowers white.
 - C. Capsule short and broad, 5–6 mm. long.....50. *M. bartonioides*
 - CC. Capsule cylindrical, 15–20 mm. long.....49. *M. Solieri*
 - BB. Flowers deep yellow.....48. *M. citrina*
- AA. Stems glabrous or nearly so (except in 52).
 - B. Subtending bracts linear-lanceolate; inflorescence not congested, not entirely concealed by bracts.
 - C. Petals 2–15 mm. long.
 - D. Capsule narrowly elongated, several times longer than broad.
 - E. Seeds irregularly angled, not grooved, or but slightly so on one angle, tuberculate.
 - F. Petals generally small, 2–8 mm. long.
 - G. Petals 2–4 mm. long; leaves entire or sinuately pinnatifid.....51. *M. albicaulis*
 - GG. Petals 5–8 mm. long; all leaves sinuately pinnatifid.
 - H. Petals 5–6 mm. long.....51b. *M. albicaulis* var. *gracilis*
 - HH. Petals 8 mm. long.....51a. *M. albicaulis* var. *ctenophora*
 - FF. Petals generally large, 5–15 mm. long.
 - G. Petals 8–14 mm. long; calyx-lobes 5 mm. long.

- H. Flowers golden-yellow; seeds slightly grooved on one angle 52. *M. gracilenta*
- HH. Flowers copper-colored at the base; seeds not definitely grooved on one angle 52b. *M. gracilenta* var. *pectinata*
- GG. Petals 5–8 mm. long; calyx-lobes 3 mm. long 52a. *M. gracilenta* var. *Veatchiana*
- EE. Seeds regularly and sharply angled, grooved on angles, minutely muricate.
- F. Leaves mostly ovate-lanceolate, entire or sinuate-pinnatifid; petals 3–6 mm. long.
- G. Petals 3–4 mm. long.
 - H. Stems loosely branched; capsules 15–25 mm. long 56. *M. dispersa*
 - HH. Stems densely branched; capsules 10–13 mm. long 56b. *M. dispersa* var. *compacta*
- GG. Petals 5–6 mm. long 56a. *M. dispersa* var. *latifolia*
- FF. Leaves lanceolate, more or less deeply pinnatifid; petals 6–8 mm. long 55. *M. affinis*
- DD. Capsule shortened, nearly as broad as long.
- E. Stamens 25–30 in 2 series 47. *M. pinnatifida*
- EE. Stamens 10–13 in 1 series 47a. *M. pinnatifida* var. *uniseriata*
- CC. Petals 8–40 mm. long.
- D. Petals 20–40 mm. long, golden-yellow with a vermillion base 58. *M. Lindleyi*
- DD. Petals 8–25 mm. long, golden-yellow.
- E. Petals 15–25 mm. long.
 - F. Stamens one-half the length of petals 57. *M. nitens*
 - FF. Stamens one-third the length of petals 57b. *M. nitens* var. *eremophila*
- EE. Petals 8–12 mm. long.
 - F. Stems stout, shining-white; upper leaves triangular and mostly entire 57a. *M. nitens* var. *Jonesii*
 - FF. Stems slender, tenuous, green; upper leaves linear-lanceolate, mostly entire 57c. *M. nitens* var. *leptocaulis*
- BB. Subtending bracts ovate-orbicular to ovate-lanceolate; inflorescence congested, more or less concealed by bracts.
- C. Stamens filiform; bracts membranaceous.
- D. Leaves sinuately toothed or pinnatifid 53. *M. congesta*
- DD. Leaves mostly entire 53a. *M. congesta* var. *Davidsoniana*
- CC. Stamens broadened; bracts leaf-like 54. *M. micrantha*

47. *M. pinnatifida* (Phil.) Urban & Gilg in Nov. Act. Nat. Cur. [Abh. K. Leop.-Carol. Deutsch. Akad. Naturf.] 76: 358. 1900.

M. andina Urban & Gilg, l. c. 31. 1900.

Acrolasia bartonioides Gay, Fl. Chile 2: 429. 1846; Wedd. Chlor. And. 2: 220. 1857, not Presl.

Acrolasia pinnatifida Phil. in Anal. Univ. Chile 85: 6. 1894.

Annual; stems solitary, erect, branched at base, 6-10 cm. long, striate, yellow to yellowish-white; lower leaves alternate, linear-lanceolate, 4-5 cm. long, sinuate-dentate to sinuate-pinnatifid, base narrowed into a petiole, the intermediate leaves sessile, 2-3 cm. long, linear-lanceolate, sinuate-dentate to sinuate-pinnatifid to subentire, scabrous on both surfaces; flowers at ends of branches; calyx-tube subcylindrical, oblong, 4-6 mm. long, scabrous; calyx-lobes ovate to ovate-oblong, acute at the apex, pilose, yellowish, persistent on the fruit; petals 5, obovate to obovate-rotund, 3-4 mm. long, glabrous; stamens 25-30, in 2 series; filaments filiform, slightly dilated at the base; style persistent on the fruit; capsule oval to oval-oblong, cylindrical, attenuated, 8-9 mm. long, brownish-black, scabrous; seeds 25-30, pendulous, irregularly angled, ovate-globose or polygonal, not winged, grayish-brown, minutely granulate-punctate.

Distribution: Chile.

Specimens examined:

CHILE: Cordilleras de las Patas, Prov. Coquimbo, 3317 m. alt., without date, Gay 662 (M photograph).

47a. *M. pinnatifida* (Phil.) Urb. & Gilg var. *uniseriata* Haumann in Anal. Soc. Cient. Argent. **86: 290. 1918.**

Stems 30-40 cm. high, branched; basal leaves irregularly dentate, 15 mm. long, sessile; flowers and fruit small; petals 2-5 mm. long, pilose at apex; stamens 12-13 in one series; capsule 10-12 mm. long; seeds 15-20.

Distribution: Valley, Rio Plomo, Argentina.

Specimens examined:

NOTE: Plants more robust than is characteristic of the species. The writer has been unable to study authentic material of this variety.

48. *M. citrina* Urb. & Gilg in Nov. Act. Nat. Cur. [Abh. K. Leop.-Carol. Deutsch. Akad. Naturf.] **76: 27. 1900.**

Annual, with solitary erect branched stem, 1-1.5 dm. high, brownish-white, scabrous; leaves alternate, lanceolate to linear-lanceolate, deeply sinuate-dentate to pinnatifid, base narrowed into a petiole, the intermediate leaves sessile, lanceolate to ovate-lanceolate, sinuate-dentate, rarely entire, 5-15

cm. long, upper and lower surfaces scabrous, subcanescent; flowers at ends of branches, sessile; calyx-tube about 7 mm. long, cylindrical, obtuse at base, hirsute; calyx-lobes ovate, 2.5 mm. long, pilose; petals 5, yellow, obovate, 5–6 mm. long, pilose at apex, otherwise glabrous; stamens 20, in 1 series, 3 mm. long, filaments filiform, somewhat dilated at base, glabrous; capsule cylindrical, 1–1.5 cm. long, brownish-black, scabrous, crowned with persistent withered style and calyx-lobes; seeds 15–20, irregularly angled, oblique-subovate or subglobose, brownish, minutely-punctate, not winged.

Distribution: Argentina.

Specimens examined:

ARGENTINA: Punta de la Vaca, Camino de Uspallata, Prov. Mendoza, without date, Kurtz 3491 (M photograph).

49. *M. Solierii* (Gay) Urban & Gilg in Ber. Deut. Bot. Ges. 10: 265, pl. 14, fig. 6. 1892; in Engl. & Prantl, Nat. Pflanzenfam. 3^a: 110, fig. 37b. 1894; in Nov. Act. Nat. Cur. [Abh. K. Leop.-Carol. Deutsch. Akad. Naturf.] 76: 35. 1900.

Acrolasia Solierii Gay, Fl. Chile 2: 430. 1846.

Annual, with solitary erect branched stems, 1.5–2 dm. high, striate, grayish-white or gray, scabrous; leaves alternate, lanceolate to linear-lanceolate, 3–5 cm. long, entire, rarely sinuate-dentate, base narrowed into a petiole, intermediate leaves sessile with subcordate or subamplexicaul base, mostly entire, rarely sinuate-dentate, scabrous; flowers at apex of branches, sessile; calyx-tube cylindrical to subcylindrical, attenuated, scabrous; calyx-lobes lanceolate or ovate-lanceolate, acute, 2–4 mm. long, pilose, persistent, withered, reflexed or somewhat erect on the fruit, greenish-yellow; petals 5, obovate to obovate-lanceolate, acute at the apex, attenuated or unguiculate at the base, 4–5 mm. long, white, slightly pilose; stamens 15, in 1 series, about 3 mm. long, 5 outer filaments slightly dilated, the remaining filaments filiform; style persistent on the fruit; capsule cylindrical or subcylindrical, obtuse at the base, 1.5–2 cm. long, brownish-green; seeds 15–20, irregularly angled, shortly ovate or subglobose, minutely yellow-punctate, grayish-brown, not winged.

Distribution: Chile and Argentina.

Specimens examined:

CHILE: Los Manantiales, Cordillera del Espinazito, Prov. San Juan, 2770 m. alt., without date, Stelsner 9755 (M photograph).

50. *M. bartonioides* (Presl) Urban & Gilg in Engl. & Prantl, Nat. Pflanzenfam. 3^{te}: 110. 1894; in Nov. Act. Nat. Cur. [Abh. K. Leop.-Carol. Deutsch. Akad. Naturf.] 76: 26. 1900.

M. Haenckii Gray in Smithson. Contr. [Pl. Wright.] 3: 74. 1852, *in obs.*

Acrolasia Bartonioides Presl, Reliq. Haenk. 2: 39, pl. 55. 1835; Walp. Rep. 2: 223. 1843; 5: 776. 1845-46.

Annual, with a solitary erect branched stem 1-1.5 dm. high, yellowish, terete, striate; leaves alternate, sessile or nearly so, 1.5-2.5 cm. long, pinnatifid, base subcordate, apex obtuse, the lobes ovate to ovate-oblong with revolute margins, upper and lower surfaces of the leaves scabrous and subcanescent; flowers sessile, at ends of branches; calyx-tube subcylindrical, somewhat attenuated, densely hirsute; calyx-lobes ovate, 2 mm. long, pilose, persistent in the fruit; petals 5, white, obovate, 3 mm. long, apex pilose, otherwise glabrous; stamens 10-15, in one series, 1.5-2 mm. long, slightly dilated at base, glabrous; style filiform, 2 mm. long, glabrous; capsule cylindrical, attenuated, rotund-obtuse at the base, 5-6 mm. long, pale yellow; seeds 10-15, regularly angled, subovate to subglobose, brownish, minutely punctate, not winged.

Distribution: Chile.

Specimens examined:

CHILE: Coquimbo, without date, Philippi 734 (US).

51. *M. albicaulis* Dougl. ex Hook. Fl. Bor. Am. 1: 222. [1834] 1840; Gray in Smithson. Contr. [Pl. Wright.] 3: 74. 1852.

M. parviflora Heller in Bull. Torr. Bot. Club 25: 199. 1898.

M. tenerrima Rydb. in Mem. N. Y. Bot. Gard. 1: 271. 1900.

M. Tweedyi Rydb. *Ibid.* 1900.

Bartonia albicaulis Dougl. ex Hook. Fl. Bor. Am. 1: 222. [1834] 1840; Hook. Lond. Jour. Bot. 6: 227. 1847.

Bartonia micrantha Hook. *Ibid.* 1847.

Acrolasia tenerrima (Rydb.) Rydb. in Bull. Torr. Bot. Club 30: 277. 1903.

Acrolasia Tweedyi (Rydb.) Rydb. *Ibid.* 1903.

Acrolasia albicaulis (Dougl.) Rydb. *Ibid.* 1903.

Acrolasia viridescens Heller in *Muhlenbergia* 2: 98. 1905.

Acrolasia parviflora (Heller) Heller, *Ibid.* 1: 138. 1906.

Annual small leafy herbaceous plants 1-4 dm. high, more or less decumbent and branched at base; stems slender, white or greenish-white, shining, sparsely pubescent or puberulent below, smooth above; leaves sessile, scabrous, the lower leaves linear-ob lanceolate, 3-5 cm. long, dentate or entire, the middle leaves with several pairs of linear lobes, the upper leaves linear or lanceolate, acute, 2-3 cm. long, less deeply lobed or entire; flowers axillary, sessile, lower solitary, intermediate in pairs, and the terminal ones in corymbose clusters of 3, the two lateral on short branches and subtended by reduced leaves, middle flower naked; calyx-tube cylindrical, 10-15 mm. long, pubescent with long spreading hairs; calyx-lobes lanceolate-subulate, 2-2.5 mm. long, pale greenish-yellow; petals yellow, obovate, spatulate, 2-4 mm. long, spreading, prominently veined, emarginate; stamens shorter than petals, filaments filiform; capsule linear-cylindric, 10-15 mm. long, about 2 mm. in diameter; seeds about 30, in a single series on each placenta, tuberculate-granulate, irregularly cubical or angled.

Distribution: dry or arid sandy soil, slopes or banks, from British Columbia southward to California and New Mexico, westward from western Nebraska to the Pacific Coast.

Specimens examined:

WYOMING: Cummins, 27 July 1895, *Nelson 1455* (US); Badger, Laramie Co., 1 July 1901, *Nelson 8339* (US); Pearson's Ranch, Clark's Fork Valley, 4000 ft. alt., 11 July 1924, *Pearson 70* (RM).

COLORADO: Los Pinos, 7000 ft. alt., May 1899, *Baker 467* (US); Black Canyon, Gunnison Watershed, 7000 ft. alt., 20 June 1901, *Baker 203* (US); Paradox, Montrose Co., 17 June 1912, *Walker 109* (US).

NEW MEXICO: between Santa Fe and Cononcito, 7300 ft. alt., 23 June 1897, *Heller & Heller 3750* (US); Gila River Bottoms, near Cliff, Grant Co., 4500 ft. alt., 7 May 1903, *Metcalfe 51* (US); Sandia Mts., Lucero's Ranch, 700 ft. alt., 28 June 1914, *Ellis 250* (US).

IDAHO: Big Butte Station, 23 June 1893, *Palmer 578* (US); St. Anthony, 5 July 1901, *Merrill & Wilcox 840* (US); Spencer, 26 June 1916; *Rust 640* (US).

UTAH: near mouth of Salina Canyon, 5200 ft. alt., 14 June 1894, *Jones 5422C* (US); Asphalt, 5500 ft. alt., 12 July 1894, *Jones 5622* (US); Montezuma

Canyon, east of Monticello, 2000 m. alt., 13 Aug. 1911, *Rydberg & Garrett* 9682 (US); canyon, Beaverdam Mts., west of St. George, 1 May 1919, *Tidestrom* 9349 (US).

NEVADA: Trinity Mts., 5000 ft. alt., May 1868, *Watson* 428 (US); Mica Spring, 4000 ft. alt., 13 April 1894, *Jones* 50451 (US); Pyramid Lake, 28 May 1916, *Headly* 16 (US); Carey Canyon, Wasatch Mts., 1850 m. alt., 27 June 1919, *Tidestrom* 10100 (US).

ARIZONA: Cedar Springs, 6 July 1892, *Toumey* 165 (US); Baboquivari Valley, March–April 1903, *Griffiths* 3976 (US); Tubac, 13 March 1926, *Loomis* 1149 (US); Prescott, 14 May 1927, *Harrison* 4008 (US); near Winkelman, 30 March 1928, *Peebles, Harrison & Kearney* 5170 (US).

WASHINGTON: Ritzville, Adams Co., 490 m. alt., 6 June 1893, *Sandberg & Leiberg* 160 (US); Ellensburg, 20 May 1897, *Piper* 2682 (US); Wenatchee Flat, 4 June 1899, *Whited* 1122 (US).

OREGON: Swan Lake Valley, Klamath Co., 12 July 1902, *Walpole* 2238 (US); north of Terrebonne, 2960 ft. alt., 6 Aug. 1917, *Lawrence* 1092 (US); Squaw Creek, Grant Co., April–May 1925, *Henderson* 5122 (US).

CALIFORNIA: Bear Valley, San Bernardino Mts., 6500 ft. alt., 19 June 1894, *Parish* 3314 (US); base of White Mts., east of Law, Inyo Co., 11 May 1906, *Heller* 8232 (US); Lakeside, Eldorado Co., June–July 1912, *Geis* 121 (US); Cottonwood Spring, Riverside Co., 2000 ft. alt., 9 March 1920, *Jaeger* 918 (US); near Blythe Junction, 1200 ft. alt., 2 April 1920, *Munz & Harwood* 3461 (US); 15 miles south of Coachella, Colorado Desert, 12 April 1922, *Pearson* 751 (PH); 5–6 miles north of Yermo, San Bernardino Co., 2000 ft. alt., 25 March 1932, *Pearson* 9836 (M, PH, UM).

51a. *M. albicaulis* Dougl. var. *ctenophora* (Rydb.) Darlington, n. comb.

M. ctenophora Rydb. in Bull. Torr. Bot. Club 28: 33. 1901.
Acrolasia ctenophora Rydb. *Ibid.* 30: 277. 1903.

Stems 3–6 dm. high, diffuse to branched; lower leaves 1–2 dm. long, pectinately laciniate; calyx-lobes 4–5 mm. long; petals about 8 mm. long.

Distribution: in sandy soil from Montana and British Columbia southward to Nebraska and Arizona.

Specimens examined:

COLORADO: Florence, 7000 ft. alt., 12 June 1895, *Tweedy* 104 (US); Cuchara River, below La Veta, 2100 m. alt., 30 May 1900, *Rydberg & Vreeland* 5769 (RM TYPE); Evans, 1907, *Johnston* (RM).

OREGON: near Hoover Creek, Gilliam Co., 990 m. alt., 1 June 1894, *Leiberg* 136 (C, F, US); Klamath Agency, 30 June 1902, *Walpole* 2225 (US).

51b. *M. albicaulis* Dougl. var. *gracilis* (Rydb.) Darlington, n. comb.

Trachyphytum gracile Nutt. ex Torrey & Gray, Fl. N. Am. 1: 534. 1840; Rydb. in Bull. Torr. Bot. Club 31: 566. 1904, *nomen nudum*.

Acrolasia gracilis Rydb. l. c.

Plants usually erect; all leaves pinnatifid with many lobes; petals 5–6 mm. long.

Distribution: sandy soil on hillsides and river bottoms from Colorado northwestward to Wyoming, Idaho, and Oregon, south to California and Arizona.

Specimens examined:

WYOMING: Fort Steele, 6500 ft. alt., 10 June 1901, Tweedy 4573 (US); Chugwater, 30 June 1909, Cary 345 (US).

COLORADO: Salida, 7500 ft. alt., 19 June 1898, Baker, Earle & Tracy 14 (US).

IDAHO: Pocatello, 26 May 1893, Palmer 36 (US); Snake River Bluffs, Fayette, 22 May 1911, Macbride 865 (US).

UTAH: Milford, 4900 ft. alt., 10–11 May 1903, Stokes (US); St. George, April 1880, Jones (US).

NEVADA: Vegas Wash, Lincoln Co., 300 m. alt., 12 March 1891, Coville & Funston 410 (US); Calientes, 24 May 1902, Goodding 943 (US p. p.).

ARIZONA: Verde Mesa, 1867, Smart 119 (US); Ash Fort, 18–27 May 1903, Griffith 4554 (US); Santan Mts., 22 March 1926, Peebles, Harrison & Kearney 1239 (US).

WASHINGTON: Wallula, Walla Walla Co., 23 May 1903, Cotton 1037 (US).

OREGON: between Bear Buttes and Prineville, Crook Co., 1110 m. alt., 25 June 1894, Leiberg 328 (US); between the Agency and Williamson River Bridge, 23 July 1902, Coville 1216 (US); north end of Summer Lake, Lake Co., 1360 m. alt., 6 June 1911, Eggleston 6863 (US).

CALIFORNIA: Furnace Creek Canyon, Funeral Mts., 720 m. alt., 29 Jan. 1891, Coville & Funston 351 (US); near Campo, San Diego Co., 24 May 1903, Abrams 3589 (ANS, M, P, US); vicinity of Doyle Station, Lassen Co., 29 May 1911, Eggleston 6737 (US); desert, east of Daggett, 28 May 1920, Muns & Harwood 3649 (US).

52. *M. gracilenta* Torrey & Gray, Fl. N. Am. 1: 534. 1840; Brewer & Watson, Bot. Calif. 1: 236. 1876.

M. albicaulis Dougl. var. *gracilenta* Watson in U. S. Geol. Surv. Fortieth Parallel [Bot. King's Exp.] 5: 115. 1871; Urban & Gilg in Nov. Act. Nat. Cur. [Abh. K. Leop.-Carol. Deutsch. Akad. Naturf.] 76: 29. 1900.

Acrolasia gracilenta (T. & G.) Rydb. in Bull. Torr. Bot. Club 30: 278. 1903.

Annual, 1–4 dm. high; stems erect and strict, simple or

sparingly branched, green or greenish-white, pubescent; leaves linear-lanceolate to narrowly oblong, sessile, pinnatifid with short obtuse lobes, often entire; flowers clustered at the ends of the branches; calyx-lobes ovate-lanceolate, 4–6 mm. long; petals golden-yellow with an orange base, obovate or oblanceolate, rounded or obtuse at the apex, 8–14 mm. long; stamens numerous, about 40, filaments filiform, subulate; capsule clavate to obconic, 10–20 mm. long; seeds in 3 rows, about 20, prismatic, minutely tuberculate.

Distribution: valleys and slopes from southern Nevada southward through Inyo County to Monterey County, California.

Specimens examined:

CALIFORNIA: Atascadero, San Luis Obispo Co., without date, *Brewer* 506 (US); near Ranch Jolon, Monterey Co., 7 May 1861, *Brewer* 575 (US TYPE); Fort Tejon, Kern Co., 1876, *Kennedy* 35 (F); Colton, San Bernardino Co., 29 April 1882, *Jones* 3487 (CAS, F, M, US); near Willow Creek, Panamint Mts., Inyo Co., 7 May 1891, *Coville & Funston* 748 (US); Erskine Creek, Riverside Co., April–Sept. 1897, *Purpus* 5498 (C, M, US); Fremont's Peak, San Benito Co., May 1903, *Elmer* 4903 (CAS, M, P, US); Vancouver Pinnacles, San Benito Co., 31 May 1915, *Hall* 9961 (US); Aguanga, Riverside Co., 29 April 1922, *Muns* 5113 (P).

52a. *M. gracilenta* Torr. & Gray var. *Veatchiana* (Kellogg) Jepson, Man. Fl. Pl. Calif. 652. 1925.

M. Veatchiana Kellogg in Proc. Cal. Acad. 2: 99. 1861.

M. albicanalis Dougl. var. *Veatchiana* (Kellogg) Urban & Gilg in Nov. Act. Nat. Cur. [Abh. K. Leop.-Carol. Deutsch. Akad. Naturf.] 76: 28. 1900.

Acrolasia Veatchiana (Kellogg) Rydb. in Bull. Torr. Bot. Club 30: 278. 1903.

Leaves mostly deeply pinnatifid; calyx-lobes about 3 mm. long; petals 5–8 mm. long.

Distribution: mountainous areas from Montana and British Columbia southward to California and Arizona.

Specimens examined:

COLORADO: Surface Creek, Delta Co., 6100 ft. alt., June 1892, *Purpus* 80 (F); Grand Junction, Gunnison Mesa, 15 May 1916, *Eastwood* 5078 (CAS); Morrison, 5800 ft. alt., 22 June 1918, *Clokey & Osterhout* 3095 (CAS, M, RM).

ARIZONA: Clifton, 7 March 1881, *Rusby* 138 (C); Ash Fork, May 1883, *Rusby* 611 (C); from Chlorida to the River, 13 May 1931, *Eastwood* 18310 (CAS, M); Keams Canyon, 14 June 1932, *Harrison* 3724 (US).

NEVADA: Virginia City, without date, *Veatch* (CAS TYPE); Quinn River Crossing, July 1901, *Griffiths & Morris* 120 (US); Peavine Mountain, Washoe Co., 22 June 1909, *Heller* 9763 (ANS, CAS, F, M, US); west of Carson City, 1800 m. alt., 5 July 1919, *Tidestrom* 10260 (P, US); desert between Winnemucca and Elko, 7 June 1930, *Van Dyke* (CAS).

OREGON: Klamath Valley, 4200 ft. alt., 1864, *Cronkhite* 46 (C, US); near Alvord Ranch, Harney Co., June-July 1927, *Henderson* 8349 (CAS).

CALIFORNIA: Soledad, 29 March 1882, *Jones* 3133 (CAS, M, P, US); San Bernardino, 13 May 1882, *Orcutt* 102 (US); Byrne's Spring, San Bernardino Mts., 4500 ft. alt., 16 June 1894, *Parish* 3312 (M); Mount Pinos Region, Ventura Co., 15 June 1896, *Dudley & Lamb* 4508 (P); Santiago Peak, Orange Co., 15 June 1901, *Abrams* 1850 (P); near Caliente, Kern Co., 7 April 1905, *Heller* 7614 (ANS, F, M, US); Hunter's Ranch, Inyo Co., 23 May 1906, *Hall & Chandler* 7140 (RM); Tehachapi, Kern Co., 13 May 1913, *Eastwood* 3236 (CAS, US); Brown's Flat, San Antonio Mts., 4300 ft. alt., 1 July 1917, *Johnston* 1755 (P); Loyalton, Sierra Co., 29 June 1918, *Eastwood* 7795 (CAS); Barstow, desert, 13 April 1919, *Muns* 2555 (P); between Campo and Mountain Springs, San Diego Co., 24 April 1920, *Eastwood* 9549 (CAS); Granite Well, Mohave Desert, 14 May 1922, *Johnston* 6458 (P); Seymour Creek, Mount Pinos, 6300 ft. alt., 10 June 1923, *Muns* 7004 (P); 40 miles west of Mexicali, 4000 ft. alt., 14 April 1925, *Muns* 9596 (P); 35 miles south of Randsburg, Mojave Desert, 5 April 1927, *Craig, Newsom & Hilend* 89 (P); Black Canyon, White Mts., 31 May 1930, *Duran* 550 (M); 1 mile north of Acton, Los Angeles Co., 12 May 1930, *Howell* 4872 (CAS); 2 miles northeast of Lovejoy Buttes, Mohave Desert, Los Angeles Co., 17 April 1932, *Pearson* 9862 (M, PH, UM).

The numerously branched stems, the clustered flowers at the ends of the branches, together with stiff stout capsules, make this variety fairly distinct from the species.

52b. *M. gracilenta* Torr. & Gray var. *pectinata* (Kellogg) Jepson, Man. Fl. Pl. Calif. 652. 1925.

M. pectinata Kellogg in Proc. Cal. Acad. 3: 40. 1863.

M. albicaulis Dougl. var. *pectinata* (Kellogg) Urban & Gilg in Nov. Act. Nat. Cur. [Abh. K. Leop.-Carol. Deutsch. Akad. Naturf.] 76: 29. 1900.

Acrolasia pectinata (Kellogg) Rydb. in Bull. Torr. Bot. Club 30: 278. 1903.

Leaves mostly pectinately pinnatifid; petals about 10 mm. long, copper-orange at the base; calyx-lobes 5 mm. long; seeds irregularly angled, usually not definitely grooved on one angle as in the species.

Distribution: canyons of southern California.

Specimens examined:

CALIFORNIA: San Bernardino, 1880, Vasey 209 (F, US); bluffs of Kern River, Kern Co., 8 April 1905, Heller 7634 (ANSP, F, M, US); Greenhorn Mts., Kern Co., 13 March 1927, Weston 519 (CAS); Rattlesnake Grade, Greenhorn Mts., Kern Co., April 1927, Weston 508 (CAS); Stone Canyon, east of Salinas Valley, Monterey Co., 22 March 1931, Howell 5948 (CAS, M); 2 miles west of Maricopa, Kern Co., 20 March 1931, Howell 5903 (CAS).

53. *M. congesta* (Nutt.) Torrey & Gray, Fl. N. Am. 1: 534. 1840; Watson, U. S. Geol. Surv. Fortieth Parallel [Bot. King's Exp.] 5: 114. 1871; Brewer & Watson, Bot. Calif. 1: 236. 1876; Greene, Fl. Francisc. 233. 1891; Urban & Gilg in Nov. Act. Nat. Cur. [Abh. K. Leop.-Carol. Deutsch. Akad. Naturf.] 76: 34-35. 1900; Macbride in Contr. Gray Herb. N. S. 56: 28. 1918; Rydberg, Fl. Rocky Mts. & Adj. Plains, ed. 2. 573. 1922; Tidestrom in Contr. U. S. Nat. Herb. [Fl. Utah & Nev.] 25: 364. 1925; Jepson, Man. Fl. Pl. Calif. 650. 1925.

Trachyphytum congestum Nutt. ex Torrey & Gray, Fl. N. Am. 1: 534. 1840.

Acrolasia congesta (Torrey & Gray) Rydb. in Bull. Torr. Bot. Club 30: 277. 1903.

Annual herbaceous plants from a slender tap-root; stems erect, 1-4 dm. high, dichotomously branched, pale yellow or white, sparingly pubescent; leaves alternate, sessile, upper and lower surfaces covered with glochidiate hairs, the margins with longer spine-like hairs, the lower leaves linear-lanceolate, base cordate, somewhat pinnatifid or incisely toothed, 5-7 cm. long, the upper leaves smaller, lanceolate, seldom incised or pinnatifid, clasping at base; flowers congested at the ends of the branches, sessile, yellow, subtended by conspicuous bracts; the bracts 3-lobed or toothed, broadly ovate, 0.6-1.8 cm. long, with the central portion white-membranaceous, the lobes or teeth of the bracts bright green, the margins ciliated, nearly concealing the cluster of 3-5 flowers and enclosing a pair of smaller bracteoles situated at the base of the calyx-tube; calyx-tube cylindrical, slightly attenuated at the base, densely covered with long glochidiate, barbed and spine-like hairs; calyx-lobes 5, lanceolate to ovate-lanceolate, 2-3 mm. long, also covered with glochidiate, barbed and spine-like hairs, persistent and erect on the fruit; petals 5, pale yellow above,

orange below, obovate, rotund at apex, 4–5 mm. long, 2–3.5 mm. broad, slightly emarginate, mostly glabrous; stamens about 20, in 1 or 2 series, filaments all filiform, incurved when young, 2.5–3 mm. long, somewhat broadened at the base, apex of anther slightly emarginate; style 2.5–3.5 mm. long, persistent on the fruit; capsule erect, cylindrical, attenuated at base, 7–10 mm. long, dark, with the persistent calyx-lobes and style obscurely striated; seeds about 20, irregularly ovate-orbicular, irregularly angled, not winged, brownish, minutely granulate-punctate, 1–1.3 mm. long, about 1 mm. broad.

Distribution: on dry hillsides, not common, in Idaho, Nevada, and California.

Specimens examined:

IDAHO: Lewis River, Rocky Mts., without date, *Nuttall* (ANSP TYPE).

NEVADA: Toyabe Mts., 6000 ft. alt., July 1868, *Watson* 431 (US); Empire City, 20 June 1882, *Jones* 3871 (CAS, M, P, US); Miller Mt., 7000 ft. alt., June 1885, *Shockley* (F); Carson City, 5000 ft. alt., 2 June 1897, *Jones* (P); Sierra Valley, 29 Aug. 1898, *Hillman* (P); Carson, 5 June 1890, *Hillman* (P); about Carson, June 1891, *Hillman* (P); hills north of Reno, 5500 ft. alt., 20 June 1900, *Stokes* (US); Dinsmore Camp, Hunter Creek Canyon, 6000 ft. alt., 20–25 June 1917, *Kennedy* 1640 (CAS); Mount Rose, Washoe Co., 9500 ft. alt., 26 Aug. 1911, *Heller* 10335 (US); mountains west of Franktown, Washoe Co., 5500 ft. alt., 2 July 1912, *Heller* 10518 (US); north of Verdi, Washoe Co., 5300 ft. alt., 24 June 1913, *Heller* 10874 (ANSP, C, F, M, US); Skyland Camp, near Glenbrook, Lake Tahoe, 29 June 1928, *Jussel* (CAS).

CALIFORNIA: Sierra Valley, without date, *Lemmon* (C); Sierra Co., coll. of 1874, *Lemmon* 95 (ANSP, M); Green Horn Mts., Kern Co., 6000–7000 ft. alt., 7–15 June 1888, *Palmer* 46 (US); Honey Lake Valley, Lassen Co., collection of 1890, *M. S. Baker* (C); range of Sierras east of Minarets, 19–22 Aug. 1899, *Congdon* (C); Avalon, Catalina Island, 28 June 1902, *Diehl* 259 (P); Bonita Meadow, Tulare Co., 8500 ft. alt., 20–24 June 1904, *Hall & Babcock* 5203 (ANSP); Palomar Mt., San Diego Co., 4800 ft. alt., 9 July 1904, *Chandler* 5427 (C); Mount Breckenridge, Kern Co., 14 June 1905, *Grinnell* 250 (US); Bishop Creek, Inyo Co., 6000 ft. alt., 31 May 1906, *Hall & Chandler* 7254 (C); Sand Harbor, Lake Tahoe region, 1909, *Eastwood* 209 (CAS); south side of Surprise Canyon, near Panamint City, Panamint Mts., Inyo Co., 7800 ft. alt., 14 June 1928, *Howell* 3916 (CAS); dry sandy areas, Rock Creek, 5 miles north of Sherwin Grace, Mono Co., 21 June 1928, *Muns* 11073 (P); 4 miles above Mono Lake, 1 July 1929, *Newson* (B); June Lake, Mono Co., 5 July 1929, *Wright* (P).

53a. *M. congesta* (Nutt.) Torrey & Gray var. *Davidsoniana*. (Abrams) Macbride in Contr. Gray Herb. N. S. 56: 28. 1918.

M. Davidsoniana Abrams, Fl. Los Angeles, 235. 1917.

Acrolasia Davidsoniana Abrams in Bull. Torr. Bot. Club 32: 538. 1905.

Annual, erect, 2-3 dm. high; leaves somewhat pinnatifid to nearly entire; calyx-lobes lanceolate, 3 mm. long; petals 8 mm. long; bracts conspicuous, mostly scarious, narrow, concealing the capsules; seeds irregularly angled, only occasionally grooved.

Distribution: in open, pine forests of Nevada and California.

Specimens examined:

NEVADA: Slide Mt., Washoe Co., 7800 ft. alt., 11 July 1910, Heller 10202 (CAS); between Minden and Lake Tahoe, 1 July 1929, Newsom (P).

CALIFORNIA: Pah Ute Peak, 7000-8000 ft. alt., April-Sept. 1897, *Purpus* 5286 (M, US); Coldwater Fork of Lytle Creek, San Antonio Mts., 7 July 1918, Johnston 2059 (P); Big Rock Creek, San Gabriel Mts., 4200 ft. alt., 25 May 1923, Muns 6799 (P); Mount Wilson, 30 June 1902, Abrams 2580 (P).

54. *M. micrantha* (Hook. & Arn.) Torrey & Gray, Fl. N. Am. 1: 535. 1840; Walp. Rep. 2: 225. 1843; Watson, U. S. Geol. Surv. Fortieth Parallel [Bot. King's Exp.] 5: 114. 1871; Brewer & Watson, Bot. Calif. 1: 236. 1876; Greene, Fl. Francisc. 233. 1891; Urban & Gilg in Nov. Act. Nat. Cur. [Abh. K. Leop.-Carol. Deutsch. Akad. Naturf.] 76: 37-38. 1900; Jepson, Man. Fl. Pl. Calif. 650. 1925.

M. micrantha (Hook. & Arn.) Torrey & Gray var. *stricta* Davidson in Davidson & Moxley, Fl. South. Calif. 239. 1923.

Bartonia micrantha Hook. & Arn. in Bot. Beechey Voy. 343. 1840.

Acrolasia micrantha (Torr. & Gray) Rydb. in Bull. Torr. Bot. Club 30: 278. 1903.

Acrolasia micrantha (Torr. & Gray) Rydb. var. *stricta* Davidson in Bull. So. Calif. Acad. Sci. 5: 15. 1906.

Acrolasia Catalinensis Millsp. in Field Mus. Nat. Hist. Publ. Bot. 5: 177. 1923.

Annual herbaceous plants from a stout tap-root; stems erect, more or less freely branching, simple below, dichotomous above, 10-45 cm. high, yellow or nearly white, somewhat pubescent below, hispid above with glochidiate and spine-like hairs; lower leaves alternate, ovate to lanceolate, 1-9 cm. long, 1.2-1.6

cm. broad, sinuately toothed or serrate, acute or acuminate at the apex, base often narrowed into a slender petiole, middle and upper leaves sessile, subcordate at the base, lanceolate or ovate-lanceolate to ovate, acute at the apex, 2.5–14 cm. long, 0.6–3.5 cm. broad, inconspicuously or deeply sinuate-toothed, upper surface of leaves covered with antrorse tuberculate-hispid hairs intermixed with glochidiate hairs, the lower surface densely covered with glochidiate hairs and a few antrorse spine-like hairs; flowers sessile, congested into compact cymose clusters at the apex of the branches, rarely corymbose, cymes 3–5-forked, as long as or slightly exceeding the floral bracts; bracts and bracteoles ovate to ovate-orbicular, obtuse at the apex, 0.3–1.4 cm. long, entire or slightly dentate, yellowish-green, seaceous; calyx-tube usually concealed by floral bracts, cylindrical, not attenuated, obtuse at base, 3–4 mm. long, terete or subangular, densely covered with long verticillate glochidiate antrorse spine-like hairs; calyx-lobes small, lanceolate, acute, 2 mm. long, 0.8–1 mm. broad, persistent and erect in fruit, yellowish, pubescence the same as on the calyx-tube; petals 5, imbricated, obovate to obovate-rotund, 3–3.5 mm. long, 2–3 mm. broad, attenuated at base, sparsely pilose near the apex, otherwise glabrous; stamens 10–20, in 1 series, the 5 stamens opposite the petals short, 2.5 mm. long, about 1.5 mm. broad, apex tricuspidate, middle cusp antheriferous, the two outer cusps shorter and sterile, the remaining filaments filiform, about 3 mm. long, slightly dilated at the base; style 3–4 mm. long, filiform, smooth, angled, apex and margins slightly pilose, persistent on the fruit; capsule cylindrical or quadrangular, not attenuated, obtuse at the base, about 1 cm. long, 2–2.5 mm. broad, brownish-green to brownish-black, papery or somewhat leathery, with persistent calyx-lobes and style; seeds 5–8, in 1 series on the narrow placentae, not compressed, mottled brown, minutely yellow-punctate, not winged, 1.5 mm. long and nearly as broad.

Distribution: dry hillsides and rocky canyons of the Coast Range Mountains in California from Trinity County southward throughout southern California, adjacent islands, and northern Lower California.

Specimens examined:

CALIFORNIA: TRINITY COUNTY—near Big Bar, 1400 ft. alt., 29 June 1923, *Tracy 6485* (C); LAKE COUNTY—southeast side of Snow Mt. above Bonnie View, 7 June 1919, *Heller 13237* (ANS, CAS, F, M, US); SANTA CLARA COUNTY—Saratoga, Sept. 1893, *Burtt-Davy 245* (C); Black Mt., July 1903, *Elmer 4588* (C, CAS, M, P, US); MONTEREY COUNTY—Santa Lucia Mts., July and Aug. 1880, *Vasey 207* (US); Mt. Diablo, 30 May 1920, *Sutliffe* (CAS); SANTA BARBARA COUNTY—trail to Zaca Peak, Zaca Lake Forest Reserve, 19–30 June 1906, *Eastwood* (CAS); Mono Creek, 2500 ft. alt., 19 May 1907, *Hall 7794* (C); VENTURA COUNTY—Ojai and vicinity, 600 ft. alt., 22 May 1866, *Peckham* (US); base of bluffs, Point Mugu, 21 April 1928, *Howell 3749* (CAS); Santa Susana Pass, 29 May 1931, *Howell 6577* (CAS); LOS ANGELES COUNTY—sandy washes in canyons, Sierra Santa Monica, April–May 1890, *Hasse* (M, P, US); banks of San Gabriel River, 600 m. alt., 8 May 1898, *Leiberg 3382* (US); foothills near Sherman, 12 May 1901, *Braunton 55* (US); Monrovia, 14 June 1904, *Grant 6424* (C, F, RM); San Fernando Wash, 11 May 1913, *Eastwood 3161* (CAS); Griffith Park, 12 June 1915, *Macbride & Payson 817* (RM); Topanga Canyon, Santa Monica Mts., 3 June 1916, *Hatt* (P, US); Rubio Canyon, San Gabriel Range, 1800 ft. alt., 12 June 1918, *Pearson 119* (PH); east trail to Mt. Lowe, 3500 ft. alt., 14 May 1919, *Pearson 2302* (PH); burned-over area, San Dimas Canyon, 1500 ft. alt., 29 April 1920, *Muns & Harwood 3796* (P, RM, US); North Fork San Gabriel, 3000 ft. alt., 20 June 1921, *Pearson 2465* (PH); Fish Canyon, San Gabriel Mts., 1750 ft. alt., 21 May 1923, *Pearson 4450* (PH); San Gabriel Canyon, 1000 ft. alt., 23 April 1925, *Muns 9416* (P); near La Canada, 12 June 1926, *Reed 5240* (P); Soledad Canyon road at junction with Mint Canyon Road, 19 June 1927, *Craig 470* (P); Mandeville Canyon, near Santa Monica, 3 March 1928, *Bryan 70* (P); Los Alisos Canyon, Santa Monica Mts., 18 April 1931, *Epling* (M); Santa Catalina Island, 13 May 1890, *Brandegee* (CAS); Avalon, May 1895, *Trask* (US); Peebles Beach Road, 25 ft. alt., 31 May 1912, *Smith 5054* (F); SAN BERNARDINO COUNTY—desert washes, San Bernardino, 1880, *Parish & Parish 214* (ANS); foothills, San Bernardino, May 1886, *Parish 214 A* (M); Waterman Canyon, San Bernardino Mts., 3000 ft. alt., 29 June 1894, *Parish 3486* (M, US); vicinity of San Bernardino, 1500 ft. alt., 11 May 1901, *Parish 4775* (P, US); southern slopes of San Bernardino Mts., 1700 ft. alt., 24 May 1909, *Parish 7105* (C); Cucamonga Canyon, 14 July 1915, *Davis 549* (P); Cucamonga Canyon, on ridge above Charcoal Camp, San Antonio Mts., 4700 ft. alt., 30 June 1918, *Johnston 2051* (P); Arrowhead Canyon near San Bernardino, 2000 ft. alt., 14 May 1919, *Spencer 1143* (CAS, P); San Dimas Canyon, 1500 ft. alt., 21 April 1921, *Muns & Harwood 3703* (P); San Bernardino Mts., 15 Aug. 1923, *Jones* (P); Arrowhead Springs, 1450 ft. alt., 7 May 1924, *Feudge 811* (P); Casey Trail to San Sevaine flats, San Antonio Mts., 3000 ft. alt., 10 July 1925, *Johnston* (P); Hesperia, 20 May 1929, *Jones* (P); RIVERSIDE COUNTY—Temecula Creek, 1 June 1899, *Hall 1219* (C); Santiago Peak Trail, Santa Ana Mts., 30 May 1931, *Howell 6589* (CAS); ORANGE COUNTY—Claymine Canyon, north of Santa Ana Mts., 1000 ft. alt., 3 July 1927, *Howell 2642* (CAS); SAN DIEGO COUNTY—San Clemente Canyon, dry slope of canyon south of "Lemon Tank," 10 April 1923, *Muns 6749* (P).

LOWER CALIFORNIA: Sanzel, 7 May 1883, *Orcutt & Fish* (US); Tia Juana Can-

yon, Guadalupe Island, in ravines at middle and south end of island, Palmer 32 (M); 20 March 1897, Anthony & Brandegee 259 (C, F, M, P, US).

55. *M. affinis* Greene in Pittonia 2: 103. 1890; Greene, Man. Bot. Reg. San. Francis. Bay, 141. 1894; Abrams, Fl. Los Angeles & Vic. 256. 1904; Jepson, Fl. West. Mid. Calif. 322. 1901, ed. 2. 268. 1911; Jepson, Man. Fl. Pl. Calif. 651. 1925; Macbride in Contr. Gray Herb. N. S. 56: 25–26. 1918.

Acrolasia affinis (Greene) Rydb. in Bull. Torr. Bot. Club 30: 278. 1903.

Annual herbaceous plants from a slender tap-root, coarse, robust; stems usually white and shining, glabrous below, sparingly pubescent above with short glochidiate hairs, often simple and leafy below, widely branching above; leaves alternate, lanceolate or ovate-lanceolate, acute or obtuse at the apex, broadly lanceolate at the base, 2–9 cm. long, deeply sinuate-pinnatifid, or rarely almost entire, sessile, upper surface armed with jointed, straight or curved spine-like hairs with bulbous bases, the lower surface more densely covered with short slender barbed glochidiate hairs; flowers numerous, solitary in the forks of, or terminating, the branches; calyx-lobes attenuate-subulate, about 5–6 mm. long, spreading and mostly recurved at maturity; calyx-tube linear, subterete, 15–25 mm. long, clothed with stiff white barbed glochidiate hairs intermixed with long spine-like hairs with bulbous bases; petals yellowish-white, 6–8 mm. long, obovate with the base broadly spatulate; stamens 25–40, filaments linear; seeds short-prismatic, definitely grooved on the three angles, surfaces muriculate or muricate, often obliquely truncate at each end.

Distribution: in sandy or stony places in southwestern Arizona and central and southern California.

ARIZONA: Tucson Mts., 20 June 1892, Toumey 163 (US); Tucson Mts., vicinity of Tucson, 11 April 1913, Greenman & Greenman 46 (M); Tucson, 21 March 1919, Eastwood 8067 (CAS).

CALIFORNIA: desert, southern California, 1881, Parish & Parish 629 (F); SAN JOAQUIN COUNTY—Tracy, 10 April 1892, Michener & Bioletti (US); in sandy bottom, Tracy, 25 April 1903, Baker 2781 (CAS, F, M, P, RM, US); FRESNO COUNTY—7 miles southwest of Coalinga, 23 March 1925, Muns 9157 (P); KERN COUNTY—Maricopa Hills, 15 May 1913, Eastwood (CAS); Caliente Creek, north base of Tehachapi Pass, 19 March 1925, Muns 8987 (P); LOS ANGELES COUNTY—Mount

Black Jack, Santa Catalina Island, May 1896, *Trask* (M); Pasadena, May 1901, *Grant* 773 (US); Playa del Rey, March 1903, *Braunton* 866 (US); Santa Catalina Island, 20-25 July 1917, *Eastwood* 6478 (CAS); between Lancaster and Victorville, 27 April 1930, *Hart* (CAS); VENTURA COUNTY—Simi, May 1902, *Hall* 3226 (P); ORANGE COUNTY—hills back of Santa Ana, 1900, *Geis* 517 (P); RIVERSIDE COUNTY—Hemet, May 4, 1904, *Baker* 4141 (P); vicinity of Riverside, 1200 ft. alt., April 1903, *Hall* 3829 (RM); Wrights, 17 miles west of Los Banos, 3 April 1912, *Wooton* (US); Chuckawalla Bench, Colorado Desert, 1200 ft. alt., 29 March 1922, *Jaeger* 816 (US); SAN DIEGO COUNTY—dry hillsides near Tia Juana, 14 May 1903, *Abrams* 3477 (M, P); IMPERIAL COUNTY—Indian Wells, Colorado Desert, 14 April 1922, *Muns & Keck* (P).

56. *M. dispersa* Watson in Proc. Am. Acad. 11: 137. 1876; Brewer & Watson, Bot. Calif. 1: 236. 1876; Greene, Fl. Francisc. 232. 1891; Howell, Fl. N. W. Am. 1: 240. 1897; Coulter & Nelson, Man. Bot. Rocky Mts. 325. 1909; Macbride in Contr. Gray Herb. N. S. 56: 25. 1918; Rydberg, Fl. Rocky Mts. & Adj. Plains, ed. 2. 574. 1922; Jepson, Man. Fl. Pl. Calif. 651. 1925.

M. albicaulis Dougl. var. *integrifolia* Watson in U. S. Geol. Surv. Fortieth Parallel [Bot. King's Exp.] 5: 114. 1871.

M. integrifolia (Wats.) Rydb. in Mem. N. Y. Bot. Gard. 1: 271. 1900.

M. albicaulis Dougl. var. *genuina* Urban & Gilg in Nov. Act. Nat. Cur. [Abh. K. Leop.-Carol. Deutsch. Akad. Naturf.] 76: 28. 1900.

M. pinetorum Heller in Bull. So. Cal. Acad. Sci. 2: 69. 1903.

M. dispersa Wats. var. *obtusa* Jepson, Man. Fl. Pl. Calif. 651. 1925.

M. dispersa Wats. var. *pinetorum* Jepson, *Ibid.* 1925.

Acrolasia integrifolia (Wats.) Rydb. in Bull. Torr. Bot. Club 30: 278. 1903.

Acrolasia pinetorum Heller in Muhlenbergia 2: 99. 1905.

Acrolasia dispersa (Wats.) Davidson in Bull. So. Cal. Acad. Sci. 5: 14. 1906.

Acrolasia montana Davidson, *Ibid.* 18. 1906.

Acrolasia desertorum Davidson, *Ibid.* 16. 1906.

Acrolasia albicaulis Dougl. var. *integrifolia* (Wats.) Daniels, Fl. Boulder, Colo. 174. 1911.

Annual, 1-3 dm. high; stems slender, erect, usually sparsely branched, smooth below, puberulent above; lower leaves nar-

rowly lanceolate, entire, the middle leaves ovate-lanceolate, sinuate-dentate, rarely pinnatifid, the uppermost leaves ovate, entire, all leaves sessile; flowers small, mostly approximate toward the ends of the branches; calyx-lobes about 2 mm. long, persistent and erect in the mature fruit; petals obovate or spatulate, 3-4 mm. long; stamens 15-40, filaments filiform; capsule narrowly linear-clavate, 15-25 mm. long; seeds few, in a single row on each placenta, prismatic to somewhat rhomboidal, grooved on the angles, grayish-green, minutely muriculate, appearing almost smooth to the naked eye.

Distribution: sandy soil from Montana to Colorado, west to Washington, south to southern California.

Specimens examined:

MONTANA: Spanish Basin, 24 June 1897, Rydberg & Bessey 4544 (F, RM, UM, US); Prickly Pear Canyon, 23 July 1887, Williams 687 (US); Midvale, 27 July 1903, Umbach 549 (F, US); Bozeman, June-Sept. 1905, Blankinship 205 (ANSB, F, M, P, RM, UM, US).

WYOMING: Laramie Hills, 10 July 1891, Buffum 346 (RM); Pole Creek, 30 June 1895, Nelson 1375 (M, RM, US); Cummings, 28 July 1895, Nelson 1455 (RM); Mammoth Hot Springs, 20 July 1899, Nelson & Nelson 6006 (M, RM, US); Silver Gate, 24 July 1902, Mearns 2252 (US); east of Afton, Lincoln Co., 30 June 1923, Payson & Armstrong 3315 (ANSB, M, P, RM).

COLORADO: indefinite locality, 1868, Vasey 195 (US TYPE); near Boulder, 6 July 1892, Patterson 209 (F, M); near Hot Sulphur Springs, 3-8 Aug. 1907, Ramaley & Robbins 3578 (RM); Morrison, 22 June 1918, Clokey & Osterhout 3100 (CAS, M, P, RM); Boulder Canyon, 18 July 1921, Clokey & Bethel 4216 (RM, US).

IDAHO: above Lewiston, 9 May 1892, Sandberg, MacDougal & Heller 144 (ANSB, CAS, F, US); Lake Waha, Nez Perces Co., 21 June 1894, Henderson 2714 (RM, US); Cedar Mountain, Latah Co., May 1897, Elmer 787 (M, RM, US); Salmon, Lemhi Co., 23 June 1920, Payson & Payson 1757 (CAS, RM).

UTAH: Antelope Island, June 1869, Watson 430 (US); American Fork Canyon, 28 July 1880, Jones 1461 (F, P); Asphalt, 12 July 1894, Jones 5622 (US); Logan Canyon, Cache Co., 27 June 1909, Smith 1709 (RM).

NEVADA: Glenbrook, Douglas Co., 22 July 1902, Baker 1345 (CAS, F, M, P, RM, US); Carson sink region, Churchill Co., 15 July 1908, Kennedy 1775 (CAS); Peavine Mountain, Washoe Co., 22 June 1909, Heller 9763 (CAS); Hunter's Canyon, near Reno, 18 July 1913, Hitchcock 542 (US).

WASHINGTON: Tumwater Canyon, Wenatchee River, 21 July 1893, Sandberg & Leiberg 519 (ANSB, CAS, M, US); Charles Springs, Spokane Co., 8 July 1902, Kreager 115 (M, US); Lookout Mountain, near Leavenworth, Chelan Co., 23 May 1913, Thompson 6508 (M).

OREGON: Dalles, 10 June 1869, Kellogg & Harford 292 (M, US); Swan Lake Valley, Klamath Co., 14 June 1896, Applegate 213 (US) near Maupin, Wasco Co.,

28-30 July 1922, *Abrams* 9545 (P); Madras, Jefferson Co., 3 July 1931, *Howell* 7177 (CAS).

CALIFORNIA: Yosemite National Park, June-Sept. 1866, *Bolander* 4863 (F, M, US); Colton, San Bernardino Co., 28 April 1882, *Jones* 2729 (P, US); near Havilah, Kern Co., 24 June 1891, *Coville & Funston* 1086 (US); near Edgewood, Siskiyou Co., 28-31 July 1892, *Palmer* 2574 (US); Frazier Mt., Ventura Co., 17 June 1896, *Dudley & Lamb* 4570 (P); Pah Ute Peak, April-Sept. 1897, *Purpus* 5102 (M, US); near Lily Lake, Eldorado Co., 23 July 1906, *Eastwood* 897 (CAS); east of Red Clover Valley, Plumas Co., 4 July 1907, *Heller & Kennedy* 3722 (ANSP, CAS, F, M, US); Deer Park, Placer Co., 15-19 June 1912, *Eastwood* 683 (ANSP, CAS); Icehouse Canyon, San Antonio Mts., 30 July 1917, *Johnston* 1602 (P); Palomar Mts., San Diego Co., 22 June 1924, *Muns* 8293 (P); Surprise Canyon, Panamint Mts., Inyo Co., 14 June 1928, *Howell* 3917 (CAS); Mather, Tuolumne Co., 28 May 1931, *Keck* 1111 (CAS).

56a. *M. dispersa* Watson var. *latifolia* (Rydb.) Macbride in Contr. Gray Herb. N. S. 56: 26. 1918.

M. latifolia (Rydb.) Nels. in Coulter & Nelson, Man. Bot. Rocky Mts. 324. 1909.

Acrolasia latifolia Rydb. in Bull. Torr. Bot. Club 31: 567. 1904.

Leaves coarsely toothed or entire, 5-10 cm. long; calyx-lobes 2.5-3 mm. long; petals obovate-spathulate, 5-6 mm. long; capsule linear-cylindrical, 2.5-3 cm. long.

Distribution: foothills and mountains, Colorado, Wyoming and west to Washington and south to central California.

Specimens examined:

WYOMING: Birdseye, 20 June 1920, *Nelson* 9408 (M, P, RM, US).

COLORADO: along the Platte River, 12 June 1878, *Jones* 220 (M, P); Rist Canyon, 29 June 1890, *Crandall* 139 (US); between Sunshine and Ward, Aug. 1902, *Tweedy* 5149 (RM); Morrison, Jefferson Co., 27 June 1920, *Clokey* 3825 (ANSP, CAS, F, M, P, RM, US).

IDAHO: Kootenai Co., July 1888, *Sandberg* (F); Ketchum, Blaine Co., 20 July 1911, *Nelson & Macbride* 1248 (F, M, P, RM, US).

UTAH: Wahsatch, 10 Aug. 1898, *Mulford* 288 (M); Salt Lake City, July 1899, *Jones* 1461 (F).

NEVADA: north of Verdi, 24 June 1913, *Heller* 10870 (ANSP, F, M, US).

WASHINGTON: Whitman Co., 28-30 May 1904, *Beattie & Lawrence* 2356 (ANSP); near Dog Creek, Skamania Co., 2 July 1923, *Suksdorf* 11485 (ANSP, CAS, M).

OREGON: on Pine Creek, Gilliam Co., 8 June 1894, *Leiberg* 188 (C, US); Dalles, Wasco Co., 23 May 1910, *Heller* 10079 (C, CAS); Baker, 17-21 June 1916, *Eggleston* 18621 (US); north of Dufur, Wasco Co., 3 July 1931, *Howell* 7188 (CAS).

CALIFORNIA: Truckee, Nevada Co., 18 June 1885, *Sonne* 117 (ANSP); lower end

of Donner Lake, Nevada Co., 8 July 1903, Heller 6865 (ANSP, M, P, RM, US); Loyalton, Sierra Co., 29 June 1918, Eastwood 7796 (CAS).

56b. *M. dispersa* Watson var. *compacta* (Nels.) Macbride in Contr. Gray Herb. N. S. 56: 26. 1918.

M. compacta Nelson in Bull. Torr. Bot. Club 25: 275. 1898.

Acrolasia compacta (Nels.) Rydb. in Bull. Torr. Bot. Club 30: 278. 1903.

Stems low, compactly and numerously branched, whitish, pilose; leaves numerous, entire, obtuse, ovate-oblong, 1-3 cm. long, rough-hirsute; flowers yellow, sessile, small, in compact cymes at the ends of the branches; petals obovate, 3-4 mm. long; capsule linear-clavate, 10-13 mm. long; seeds 10-12.

Distribution: plains and foothills of Wyoming and Colorado westward to Washington and southward to California.

Specimens examined:

MONTANA: Craig, 21 June 1900, Wilcox 382 (US); near Glacier Park Station, 15 Aug. 1919, Standley 17667 (US); north of Windsor, 22 Aug. 1931, Howell 7908 (CAS).

WYOMING: Parkman, 22 July 1896, Nelson 2454 (M, RM); Mammoth Hot Springs, 20 July 1899, Nelson & Nelson 6013 (M, RM, US); Moorcroft, Crook Co., 2 Aug. 1901, Nelson 8552 (M, P, RM, US).

COLORADO: near Boulder, 6 July 1892, Patterson 210 (US); Steamboat Springs, 10 Aug. 1898, Shear & Bessey 4036 (US); near Boulder, July 1902, Tweedy 5160 (RM).

IDAHO: Mannis Creek, Washington Co., 8 July 1899, Jones 6324 (M, P, US); Squaw Creek, Custer Co., 23 July 1916, Macbride & Payson 3384 (CAS, M, P, RM, US).

57. *M. nitens* Greene, Fl. Francisc. 234. 1891; Urban & Gilg in Nov. Act. Nat. Cur. [Abh. K. Leop.-Carol. Deutsch. Akad. Naturf.] 76: 360. 1900.

Acrolasia nitens (Greene) Rydb. in Bull. Torr. Bot. Club 30: 278. 1903.

Annual or perennial, loosely spreading; lower branches somewhat decumbent, 3-6 dm. high; stems very white, shining; leaves few, thin, pinnately divided, linear-lanceolate; flowers solitary in the upper forks of the branches, somewhat clustered at the ends of the branches; petals oblong-obovate, obtuse or emarginate, 1.5-2.5 cm. long; stamens half the length of the petals, filaments subulate; capsule linear-clavate, 2-3.5 cm. long, hispid; seeds tuberculate, sharply angled.

Distribution: sheltered localities from western Arizona to southern California.

Specimens examined:

ARIZONA: Santa Catalina Mts., 16 March 1911, Blumer 4847 (US); Yucca, 12 March 1912, Wooton (US); Kingman to Hillside, 24 March 1931, Harrison, Kearney & Fulton 7630 (US); Fort Mohave, 23 March 1931, Harrison, Kearney & Fulton 7568 (US).

CALIFORNIA: near Pete's Garden, Johnson Canyon, Panamint Mts., Inyo Co., 31 March 1891, Coville & Funston 523 (US); west of Hesperia, San Bernardino Co., 17 May 1920, Johnston 2306 (P, US); vicinity of Corn Spring, Chuckawalla Mts., Colorado Desert, 9-12 April 1922, Muns & Keck 4886 (CAS, P).

57a. *M. nitens* Greene var. *Jonesii* (Urb. & Gilg) Darlington, n. comb.

M. albicaulis Dougl. var. *Jonesii* Urb. & Gilg, Nov. Act. Nat. Cur. [Abh. K. Leop.-Carol. Deutsch. Akad. Naturf.] 76: 29. 1900.

M. albicaulis Dougl. var. *spectabilis* Jones, Contr. West. Bot. 12: 16. 1908.

Stems semi-decumbent toward the base, stout, whitish, shining; lower leaves deeply pinnately lobed, the upper leaves triangular and mostly entire; petals 8-12 mm. long, bright yellow.

Distribution: canyons and slopes, southern Utah and Arizona and Owen's Valley, California.

Specimens examined:

UTAH: Santa Clara, 28 April 1894, Jones 5116 (C, M, P, RM, US).

ARIZONA: Yucca, 1884, Jones 3900 (CAS, F, P, US); Yarnell Hill, near Prescott, 14 April 1927, Harrison 3980 (US); between Superior and Kelvin, 30 March 1928, Peebles, Harrison & Kearney 5164 (US); near Wickenburg, 31 March 1930, Peebles & Loomis 6731 (US).

57b. *M. nitens* Greene var. *eremophila* (Jepson) Darlington, n. comb.

M. Lindleyi Torrey & Gray var. *eremophila* Jepson, Man. Fl. Pl. Calif. 650. 1925.

Petals rounded at the apex with a very slight acumination, 1.5-2.5 cm. long; stamens about one-third as long as the petals.

Distribution: desert mesas, Inyo and Kern Counties, California.

Specimens examined:

CALIFORNIA: Randsburg, 14 April 1905, Heller 7692 (ANS, F, M, US); Red

Rock Canyon, Mohave Desert, 8 May 1929, Hoffmann (CAS); Red Rock Canyon, Mohave Desert, 13 May 1930, Howell 4935 (CAS).

This appears to be an intermediate variety between the species *nitens* and *Lindleyi*. However, its habit, flower, and shape of capsule would seem to indicate that it is more closely allied with *Mentzelia nitens*, to which it is here referred.

57c. *M. nitens* Greene var. *leptocaulis* Darlington, n. var.³⁹

Stems slender, flexuous, 12–20 cm. high; leaves thin, linear-lanceolate, 3–4 cm. long, puberulent, subtending leaf elongated; flowers small, mostly solitary; petals 8–10 mm. long.

Distribution: valley of the Colorado River, Arizona.

Specimens examined:

ARIZONA: Williams Fork, 11 March 1876, Palmer 157 (F, M TYPE, US).

58. *M. Lindleyi* Torrey & Gray, Fl. N. Am. 1: 533. 1840;
Brewer & Watson, Bot. Calif. 1: 236. 1876; Greene, Fl. Francisc. 234. 1891; Jepson, Man. Fl. Pl. Calif. 652. 1925.

M. Bartonia Steud. Nomencl. ed. 2, pt. 2. 128. 1841.

M. crocea Kellogg in Proc. Cal. Acad. 7: 110. 1876.

M. aurea Baill. Hist. Pl. 8: 461, fig. 309–310. 1886; Urb. & Gilg in Nov. Act. Nat. Cur. [Abh. K. Leop.-Carol. Deutsch. Akad. Naturf.] 76: 33. 1900.

Bartonia aurea Lindley in Bot. Reg. 22: pl. 1831. 1836.

Chrysostoma aurea Lilja, Fl. Sver. Suppl. 1: 33. 1840.

Creolobus aurea Lilja, Fl. Sver. 67. 1839; Linnaea 15: 264. 1841.

Acrolasia aurea (Lindl.) Rydb. in Bull. Torr. Bot. Club 30: 278. 1903.

Annual, 1–6 dm. high, hispid; stems slender, simple or branched; leaves ovate to narrowly lanceolate, sessile, slightly clasping at base, 4–7 cm. long pectinately pinnatifid, with entire or toothed, lanceolate or linear lobes, the terminal lobe prolonged and mostly acute; flowers solitary or in clusters of 2 or 3 at the ends of the branches, axillary or terminal; calyx-

* *M. nitens* Greene var. *leptocaulis* Darlington, var. nov., caulis tenuibus, flexuis, 12–20 cm. altis; foliis tenuibus, linear-lanceolatis, 3–4 cm. longis, puberulis, folio subento elongato; floribus parvis, plerunque solitariis; petalis 8–10 mm. longis.—Williams Fork, Arizona, 11 March 1876, Palmer 157 (F, M TYPE, US).

lobes 10–15 mm. long, lanceolate, acute or acuminate; petals obovate, abruptly acuminate, 2–4 cm. long, golden-yellow with a vermillion base; stamens numerous, 2–3 cm. long, filaments mostly filiform, a few of the outer series somewhat dilated at base; capsule linear-clavate, elongated, 2.5–5.5 cm. long, somewhat thickened toward the apex, hirsute; seeds numerous, irregularly angular, minutely tuberculate.

Distribution: desert mesas, canyon slopes of southern California.

Specimens examined:

CALIFORNIA: Lone Tree Valley, June 1862, *Brewer 1225* (US); Cedar Mountain, Alameda Co., May 1903, *Elmer 4354* (CAS, M, P, US); Tulare Co., 21 July 1904, *Culbertson 4306* (P); Mount Hamilton, Santa Clara Co., 31 May 1907, *Heller 8616* (ANSF, F, M, US); Sierra Nevada Co., 1911, *Pearson 750* (PH); Pine Valley, San Diego Co., 10 May 1920, *Spencer 1815* (P); Alameda Ridge, Santa Clara Co., 18 April 1926, *Howell 1900* (CAS); near Gardenville, Humboldt Co., 16 June 1931, *Howell 6715* (CAS).

SECTION IV. BICUSPIDARIA Brewer & Watson

Section IV. BICUSPIDARIA Brewer & Watson in Bot. Calif. 1: 237. 1876; Urban & Gilg in Engl. & Prantl, Nat. Pflanzenfam. 3^{te}: 111. 1894; in Nov. Act. Nat. Cur. [Abh. K. Leop.-Carol. Deutsch. Akad. Naturf.] 76: 78. 1900.

Annuals from a fusiform root; the stems, leaves, bracts, and capsules densely clothed with glochidiate and spine-like hairs; leaves sessile, sinuate-dentate, rarely pinnatifid; flowers subtended by bracts nearly concealing the calyx-tube; petals 5, yellow or orange; filaments numerous, apex dilated, cuspidate, the middle cusp bearing the anther, the two lateral cusps or lobes sterile; capsule cylindrical, attenuated, sessile; placentae broad; seeds 15–40, in 2 series, horizontal, irregularly gibbous-rugose, plicate, opaque, not winged. Spp. 59–61.

KEY TO THE SPECIES OF SECTION BICUSPIDARIA.

- A. Bracts ovate, white, scarious, membranaceous with deeply laciniate-toothed margins and midveins.
- B. Petals 2–3 cm. long..... 51. *M. involucrata*
- BB. Petals 3.5–4.5 cm. long..... 61a. *M. involucrata* var. *megalantha*
- AA. Bracts narrowed, green and leaf-like.
- B. Flowers pedicellate.
- C. Middle anther-bearing lobe of filament 2 mm. long..... 60. *M. tricuspis*

- CC. Middle anther-bearing lobe of filament 0.5 mm. long.....
- 80a. *M. tricuspidata* var. *brevicornuta*
- BB. Flowers sessile.
- C. Flowers yellow.
- D. Middle anther-bearing lobe of filament as long as or shorter than lateral lobes..... 59. *M. hirsutissima*
- DD. Middle anther-bearing lobe of filament elongated, twice the length of lateral lobes..... 59a. *M. hirsutissima* var. *stenophylla*
- CC. Flowers orange..... 59b. *M. hirsutissima* var. *nesiotica*

59. *M. hirsutissima* Watson in Proc. Am. Acad. 12: 252. 1877; Urban & Gilg in Nov. Act. Nat. Cur. [Abh. K. Leop.-Carol. Deutsch. Akad. Naturf.] 76: 82. 1900; Johnston in Univ. Calif. Publ. Bot. 7: 443. 1922; in Proc. Cal. Acad. Sci. IV. 12: 1104. 1924.

Bicuspidaria hirsutissima (Wats.) Rydb. in Bull. Torr. Bot. Club 30: 275. 1903.

Annual or biennial herbaceous plants, stout, erect with ascending branches; older stems and branches whitish and almost glabrous, the younger parts hirsute with short barbed, and long spreading spine-like hairs; leaves sessile, linear-lanceolate, acuminate, 3–8 cm. long, irregularly pinnatifid with divaricate acute segments and teeth, upper surface clothed with long spreading spine-like hairs, these appearing also along the prominent midvein below; subtending floral bracts acuminate, with narrow hirsute lobes; flowers terminal, axillary, sessile; calyx-tube somewhat concealed by floral bracts, 10–14 mm. long, longitudinally ridged, extremely hirsute with long stiff spreading spine-like hairs and short barbed pubescence; calyx-lobes 5, 16–20 mm. long, lanceolate, long-acuminate, strongly 1-nerved, with long scattered spine-like hairs, especially along the prominent nerve, and with shorter hairs on the margins, the margins revolute near the apex; petals yellow, acute, 3–3.5 cm. long, apex slightly barbellate; stamens numerous, 100–130, in 4–5 series, the filaments orange-colored toward the apex, shortly cuspidate, 10–12 mm. long, anthers oblong; style 14 mm. long; capsule oblong, 14–15 mm. long; seeds and mature fruit not seen.

Distribution: in Lower California and islands in the Gulf of California.

Specimens examined:

LOWER CALIFORNIA: Angel Island, Bay of California, coll. of 1876, Dr. Street (US type).

One specimen, apparently a part of the type collection, was seen which, however, had no mature seeds or fruit. Urban and Gilg described the fruit as a cylindrical capsule 1.8–2.1 cm. long and 6–7 mm. broad, somewhat attenuated, subchartaceous, brownish-green, scabrous, 20-nerved, the alternating nerves less conspicuous; the calyx-lobes blackish, shriveled, persistent, irregularly erect or slightly recurved; the seeds 30–40 on biseriate placentae, horizontal, irregularly oval or oblong, about 2 mm. long and 1.5 mm. broad, irregularly gibbous-rugose, plicated, gray or grayish-yellow, minutely granulated-punctate, not winged.

There is a tendency for the calyx-lobes to become pinnately divided as in the floral bract.

59a. *M. hirsutissima* Watson var. *stenophylla* (Urb. & Gilg) Johnston in Univ. Calif. Publ. Bot. 7: 443. 1922.

M. stenophylla Urban & Gilg in Nov. Act. Nat. Cur. [Abh. K. Leop.-Carol. Deutsch. Akad. Naturf.] 76: 80. 1900.

Middle lobe of the anther greatly elongated, twice the length of the lateral lobes.

Distribution: in southern California, and the northern third of Lower California.

Specimens examined:

CALIFORNIA: Mountain Springs, San Diego Co., 12 May 1894, Schoenfeldt 3069 (US).

LOWER CALIFORNIA: San Quentin, 22 April 1886, Orrutt 1357 (F, M); Cajon de Santa Maria, 14 May 1889, Brandegee (C); Calamujuet, 10 May 1889, Brandegee (ANSP, US); opposite Pond Island, Angel de la Guardia Island, 30 June 1921, Johnston 4229 (CAS).

59b. *M. hirsutissima* Watson var. *nesiotes* Johnston in Univ. Calif. Publ. Bot. 7: 443–444. 1922.

Leaves thin, coarsely toothed; flowers orange-colored.
Distribution: on San Benito, Natividad, and Cedros Islands, Lower California.

Specimens examined:

LOWER CALIFORNIA: Los Angeles Bay, Gulf of California, 1887, Palmer 591 (US); Cedros Island, 18–20 May 1889, Palmer 712 (F, US); Cedros Island,

March–June 1897, *Anthony* 280 (C, F, M, US); Cedros Island, 1897, *Anthony* (US); San Benito Island, 28 March 1897, *Brandegee* (C TYPE); Natividad Island, 10 April 1899, *Brandegee* (C); San Bertolome Bay, 14 March 1911, *Rose* 16230 (US); Cedros Island, 12 March 1911, *Rose* 16152 (US).

60. *M. tricuspidis* Gray in Am. Nat. 9: 271. 1875; Brewer & Watson, Bot. Calif. 1: 237. 1876; Watson in Proc. Am. Acad. 12: 252. 1877; Engl. & Prantl, Nat. Pflanzenfam. 3^{te}: 111. 1895, and ed. 2. 21: 534. 1925; Urban & Gilg in Nov. Act. Nat. Cur. [Abh. K. Leop.-Carol. Deutsch. Akad. Naturf.] 76: 78–79. 1900; Johnston in Univ. Calif. Publ. Bot. 7: 444. 1922; Tidestrom in Contr. U. S. Nat. Herb. [Fl. Utah & Nev.] 25: 361, 363. 1925; Jepson, Man. Fl. Pl. Calif. 649. 1925.

Bicuspidaria tricuspidis (Gray) Rydb. in Bull. Torr. Bot. Club 30: 275. 1903.

Acrolasia tricuspidis (Gray) Davidson in Bull. So. Calif. Acad. Sci. 9: 71. 1910.

Annual herbaceous plants, scabrous, from a slender tap-root, diffusely branched from the base, 0.5–2.4 dm. high; stems erect or spreading, yellowish-white, striate, densely hispid with short verticillate glochidiate and scattered longer spine-like hairs, the older parts of the stem sometimes becoming almost smooth; leaves alternate, linear-lanceolate to ovate-lanceolate, 2–7 cm. long, subentire to deeply sinuate-dentate, acute at the apex, subsessile or attenuated at the base into a short petiole, upper surface with glochidiate and a few spine-like hairs, especially on the leaf margins, lower surface densely hispid with glochidiate spine-like hairs scattered along the midvein; flowers terminal, short-pedicellate, solitary, yellow, subtended by small foliaceous bracts; bracts linear-lanceolate, coarsely sinuate-dentate or pinnatifid, long-attenuated at the apex, not concealing the calyx-tube; calyx-tube cylindric or turbinate, obtuse at the base, 10–15 mm. long, short-pedicelled, light brown, often mottled, densely hirsute; calyx-lobes lanceolate-subulate, erect before anthesis, later becoming reflexed, long-acuminate, 10–13 mm. long, lighter in color than the calyx-tube, pubescent; petals spatulate-obovate, apiculate, 2–2.5 cm. long, narrowed or unguiculate at the base, minutely pilose at the apex, otherwise glabrous; stamens 80–100, in 4 series, the inner reflexed

and the outer erect, linear, 8-9 mm. long, slightly dilated toward the cuspidate apex, the lateral cusps sterile and twice the length of the middle cusps bearing the oblong-linear anther; style 3-cleft, angled or subterete, apex densely papillose; capsule cylindric, reflexed at apex of short pedicel, crowned by the persistent reflexed calyx-lobes and withered style; seeds numerous, in 2 series on each placenta, irregularly oblong to oblong-oval, strongly rugose, grayish-green, minutely granulate-punctate, not winged.

Distribution: desert areas and dry hillsides and canyons in southern Utah and Nevada, westward to the Mohave and Colorado Deserts, south to western Arizona.

Specimens examined:

UTAH: southern Utah, 1877, *Palmer* 173 (US).

NEVADA: Vegas Waah, Lincoln Co., 350 m. alt., 2 May 1891, *Bailey* 1892 (US); St. Joe, May 1894, *Jones* 5029ak (P); Eldorado Canyon, Lincoln Co., Jan.-April 1895, *Mills* 8 (US); Moapa, 1400 ft. alt., 27 April 1904, *Jones* (P); Moapa, 8 April 1905, *Goodding* 2180 (C, M, RM); Overton, Clark Co., 1500 ft. alt., 8 June 1912, *Heller* 10440 (US); south of St. Thomas, 480 m. alt., 25 April 1919, *Tidstrom* 9141 (US).

ARIZONA: Yucca, 17 May 1884, *Jones* (P); Franconia, 900 ft. alt., 17 April 1903, *Jones* (P).

CALIFORNIA: Fort Mohave, 18 Feb. 1861, *Cooper* (US); Whitewater, Colorado Desert, April 1876, *Lemmon* 258 (C); The Needles, 5 May 1884, *Jones* 3824 (C, CAS, F, P, RM, US); gravelly washes, Needles, 500 ft. alt., 1 April 1920, *Muns & Harwood* 3639 (P, RM, US p. p.).

60a. *M. tricuspis* Gray var. *brevicornuta* Johnston in Univ. Calif. Publ. Bot. 7: 444. 1922.

Acrolasia tridentata Davidson in Bull. So. Calif. Acad Sci. 9: 71. 1910.

Lateral lobes of the filament short, oblong, about 0.5 mm. long.

Distribution: in the Mohave and Colorado Deserts, representing the western limit of distribution of the species.

Specimens examined:

CALIFORNIA: Daggett, San Bernardino Co., *Brandegee* (C); Mohave Desert, May 1881, *Parish* (US); southern base of Calico Mts., 22 April 1915, *Shreve* (A); 10 miles north of Barstow, 14 May 1922, *Johnston* 6526 (P); Newberry Mts., 7 miles east of Daggett, San Bernardino Co., 6 April 1924, *Muns & Keck* 7847 (P); foot of Mountain Spring Grande, Imperial Co., 16 April 1927, *Pearson* 7209 (PH); mud hills near Red Rock Canyon, northwest of Mohave Desert, Kern Co., 13 May 1930, *Howell* 4947 (CAS).

61. *M. involucrata* Watson in Proc. Am. Acad. 20: 367. 1885; Urban & Gilg in Nov. Act. Nat. Cur. [Abh. K. Leop.-Carol. Deutsch. Akad. Naturf.] 76: 83. 1900; Johnston in Univ. Calif. Publ. Bot. 7: 443. 1922; Tidestrom in Contr. U. S. Nat. Herb. [Fl. Utah & Nev.] 25: 361. 1925; Jepson, Man. Fl. Pl. Calif. 649. 1925.

Bicuspidaria involucrata (Wats.) Rydb. in Bull. Torr. Bot. Club 30: 275. 1903.

Annual herbaceous plants, hispid, branching from base, rarely simple, 1-3 dm. high; stems stout, erect, with white, longitudinally striated epidermis, densely pubescent, especially upper branches, with short verticillate glochidiate, and a few scattered long spine-like hairs; leaves alternate, linear to oblong-lanceolate, acute or slightly obtuse at the apex, 4-12 cm. long, coarsely sinuate-dentate, lower leaves attenuated into a short petiole, upper sessile, mostly cordate-amplexicaul at base, upper surface of leaves clothed with short spine-like hairs, lower surface, the prominent midvein, and margins densely hispid with verticillate glochidiate and some long spine-like hairs; flowers terminal, solitary, sessile, pale yellow, subtended by a pair of broadly ovate bracts; bracts acute or acuminate, white, scarious, sessile, subcordate-amplexicaul, with deeply laciniate-toothed green margins and midveins covered with short glochidiate and long stout spine-like hairs; calyx-tube subcylindrical, obtuse at the base, 15-30 mm. long, conspicuously 10-nerved, hispid with verticillate glochidiate and spine-like hairs, concealed by the subtending bracts; calyx-lobes long-acuminate, shorter than the calyx-tube, margins revolute, the prominent midvein with short glochidiate and long spine-like hairs; petals 5, obovate to oblanceolate, triangularly apiculate at the apex, base narrowed and unguiculate, 2-3 cm. long, sparsely pilose; stamens numerous, in 4-5 series, inner inflexed, outer erect, the 5 filaments opposite the sepals 3-nerved, remainder 1-nerved, linear, dilated toward apex, bicuspitate with long linear cusps, anther oblong; style tubular, 3 flattened stigmatic lobes at apex; capsule subcylindrical, slightly attenuated to an obtuse base, 1.5-2.5 cm. long, brownish-black, scabrous, papery, 20-nerved, the alternating nerves

less conspicuous, crowned with persistent withered style and the irregular erect calyx-lobes; seeds 15–40, in 1 or 2 rows on each placenta, horizontally flattened, not margined, irregularly oval to quadrangularly-rotund, gibbous-rugose, gray or yellowish-gray, 3–3.5 mm. long, minutely and densely granulate-tuberulate.

Distribution: in desert areas and on dry hillsides of western Arizona, north and westward to the Colorado and Mohave Deserts, and south to Sonora, Mexico.

Specimens examined:

ARIZONA: Yucca, 15 May 1884, Jones (P); Valley of the Hassayampa, April 1876, Palmer 598 (C, M, US cotype); Chemehuevis, 4500 ft. alt., 1 April 1903, Jones (P); Agua Caliente, 27 Feb. 1914, Carlson (CAS); hills near Evans, road from Coariz to Parker, 28 April 1915, Shreve (A); Gila Mts., Yuma Co., 4 March 1927, Harrison 3601 (US); near Dome, Yuma Co., 10 March 1928, Peebles & Harrison 5049 (US).

CALIFORNIA: Colorado Desert, dry gravelly hill slopes, Nov.–Dec. 1852, Schott 1 (F); mountains, Riverside, 25 Jan. 1858, Newberry (US); Mohave River district, San Bernardino Co., 1876, Parry & Lemmon 138 (US TYPE)—also specimen of var. *megalantha*; Whitewater, Colorado Desert, 1881, Parry 210 (M); The Needles, 8 May 1884, Jones 3855a (US); Borregos Springs, 18 April 1895, Brandegee (C); Shepherd's Canyon, 4600 ft. alt., 30 April 1897, Jones (P, US); San Felipe, May-Oct. 1898, Purpus (ANSB, C, RM); sandy soil, Signal Mountain, San Diego Co., 2 April 1903, Abrams 3166 (M, P); Colorado Desert, April 1905, Brandegee (US); Kelso, 3000 ft. alt., 2 May 1906, Jones (P); River Mountain, Colorado River, 18 March 1910, Grinnell (C); San Felipe Creek, Colorado Desert, San Diego Co., 14 April 1913, Eastwood 2712 (CAS, M, US); Needles, gravelly wash, 500 ft. alt., 1 April 1920, Muns & Harwood 3639 (US); Palm Springs, Colorado Desert, 400 ft. alt., 12 April 1922, Spencer 1143 (P); near Palm Wash, Colorado Desert, San Diego Co., 24 March 1928, Howell 3510 (CAS).

MEXICO: Port Lobos, Sonora, 28 March 1884, Pringle (F, US); near Libertad, Sonora, 21 March 1926, Shreve 5848 (US); hill north of Libertad Bay Inn, Sonora, 21 March 1926, Long 45 (A, US).

61a. *M. involucrata* Wats. var. *megalantha* Johnston in Univ. Calif. Publ. Bot. 7: 443. 1922.

Petals 3.5–4.5 cm. long.

Distribution: in the Colorado Desert, California.

Specimens examined:

CALIFORNIA: Colorado Desert, Parish (C); Santa Maria Mts., Colorado Desert, Schellenger 1 (P); Whitewater, Colorado Desert, April 1876, Lemmon 258 (F); Whitewater, 1880, Parish & Parish 210 (ANSB, F); in semi-arid land, Whitewater, 19 April 1913, Piemeisel 3481 (US); Painted Canyon, near Mecca, 30 March 1921, Evans (P); near Mecca, Colorado Desert, 160 ft. alt., 29 March 1922, Spen-

er 1900 (M, P); Cottonwood Springs, Riverside Co., 12 April 1924, Evermann (CAS, M); Westmoreland, Imperial Co., March 1926, Anderson (CAS); Coachella Valley, Colorado Desert, Riverside Co., 29 March 1927, Stason (CAS).

The variety *megalantha* differs from the typical species only in the larger more conspicuous flowers of brighter yellow. Watson, in describing the species *involucrata*, had before him a small-flowered specimen with petals about one inch in length, which became the typical form. Both the species and variety have the characteristic large white green-margined floral bracts. The variety is confined in its distribution to the Colorado Desert, whereas the species, though most common in the Colorado Desert, extends eastward into Arizona and southward into Sonora.

SPECIES EXCLUDED.

Mentzelia cordata Kellogg in Proc. Cal. Acad. 2: 33. 1863 = *Eucnide cordata* Kellogg.

Mentzelia gronoviaeefolia Fisch. & Mey. Ind. Sem. Hort. Petrop. 10: 54. 1845 = *Eucnide bartonioides* Zucc.

Mentzelia lobata Walp. Rep. 2: 224. 1843 = *Eucnide lobata* Gray.

Mentzelia synandra Nels. in Bot. Gaz. 47: 428. 1909 = *Eucnide urens* Parry.

Mentzelia urens Parry ex Gray in Proc. Am. Acad. 10: 71. 1874 = *Eucnide urens* Parry.

Mentzelia urens Vell. Fl. Flum. 5: pl. 97. 1825 = *Loasa parviflora* Schrad.

DOUBTFUL SPECIES.

Acrolasia elata Phil. in Anal. Univ. Chile 85: 5. 1894. Chile.

Acrolasia ngamderensis Guerke in Bauer, Deutsch. Niger-Bunue Exped. 163. Africa.

Mentzelia corumbaensis Hoehne in Comm. Linh. Telegr. Matto Grosso Amaz. Annexo 5, Bot. 6: 54, pl. 126. 1915. Brazil.

Mentzelia fragilis Huber in Bull. Herb. Boiss. II. 1: 314. 1901. Brazil.

Mentzelia grandiflora Ruiz & Pav. ex Don, Hist. Dichl. Pl. 3: 66. 1834. Peru.

Mentzelia hirta Pav. ex Don, Hist. Dichl. Pl. 3: 66. 1834.
Mexico.

Mentzelia ovata Thomps. in Asa Gray Bull. 7: 37. 1894 [as *orata*]; abstract in Just's Bot. Jahresh. 23²: 90. 1897, *nomen nudum*.

Mentzelia propinqua Aresch. in Freg. Eugenies Resa, Bot. 133. 1910. Ecuador.

LIST OF EXSICCATAE

The collector's numbers are indicated by *italics*, the collections without numbers are indicated by a dash. The numbers in parentheses refer to the species number used in this monograph.

- Abrams, L. R. *872*, *2686*, *9502* (22); *3589* (51b); *1850* (52a); *2580* (53a); *3477* (55); *9545* (56); *3166* (61).
- Aiton, G. B. — (21); — (22).
- Allen, G. N. — (22).
- Allart, *188* (19).
- Altamirano, F. — (4).
- Anderson, A. L. — (36).
- Anderson, F. W. *161* (20); — (22).
- Anderson, W. T. — (61a).
- Anderson, — (19).
- Andrè, E. *3187* (2); *514* (19).
- Andrews, D. M. — (21).
- Aneet, Bro. *104* (36).
- Anthony, A. W. *300* (15); —, *280* (59b).
- Anthony, A. W. & T. S. Brandegee. *259* (54).
- Applegate, E. I. *213* (56).
- Arsène, Bro. *35*, *47*, *5203*, *5288*, *5388*, *10609* (4); *470*, *1863* (17).
- Arsène, Bro. & Nicolas. *5291* (14).
- Austin, R. M. —, *855*, *21432* (22).
- Babcock, E. B. — (22).
- Bacigalupi, R. *818* (36).
- Bailey, V. — (20); — (21); *888* (36); *1892* (60).
- Baker, C. F. — (20); — (21); *3452* (22); *370*, *471* (39); *470* (40); *203*, *467* (51); *2781*, *4141* (55); *1345* (56).
- Baker, C. F., F. S. Earle & S. M. Tracy. *853* (36); *483* (39); *496* (40); *14* (51b).
- Baker, H. P. — (20); — (21).
- Baker, M. S. *548* (22); — (53).
- Ball, C. R. *1161* (20); *1212* (21).
- Bang, M. *748*, *1082* (3); *1005* (12).
- Barber, C. H. *274* (22).
- Barber, C. H. & C. M. Townsend. — (19).
- Barlow, B. — (37a).
- Bartholf, J. H. — (22).
- Bartholomew, E. — (20).
- Bartlett, A. F. — (21).
- Bartlett, H. H. *10584* (13); *10188* (14); *10817* (19).
- Bartram, E. B. — (16); *345* (36).
- Beard, A. — (36).
- Beattie, R. R. & W. H. Lawrence. *2356* (56a).
- Benke, H. C. *4165*, *5036* (36).
- Berlandier, J. L. *654* (4); *590*, *2000* (21); *522* (34).
- Bertero, E. J. — (19).
- Bethel, E. & E. B. Payson. *1616* (21).
- Bereman, S. D. *734* (21).
- Bigelow, J. M. — (13); — (21); — (36).
- Bigelow, J. M., C. C. Parry, C. Wright, C. Schott. *390* (34).
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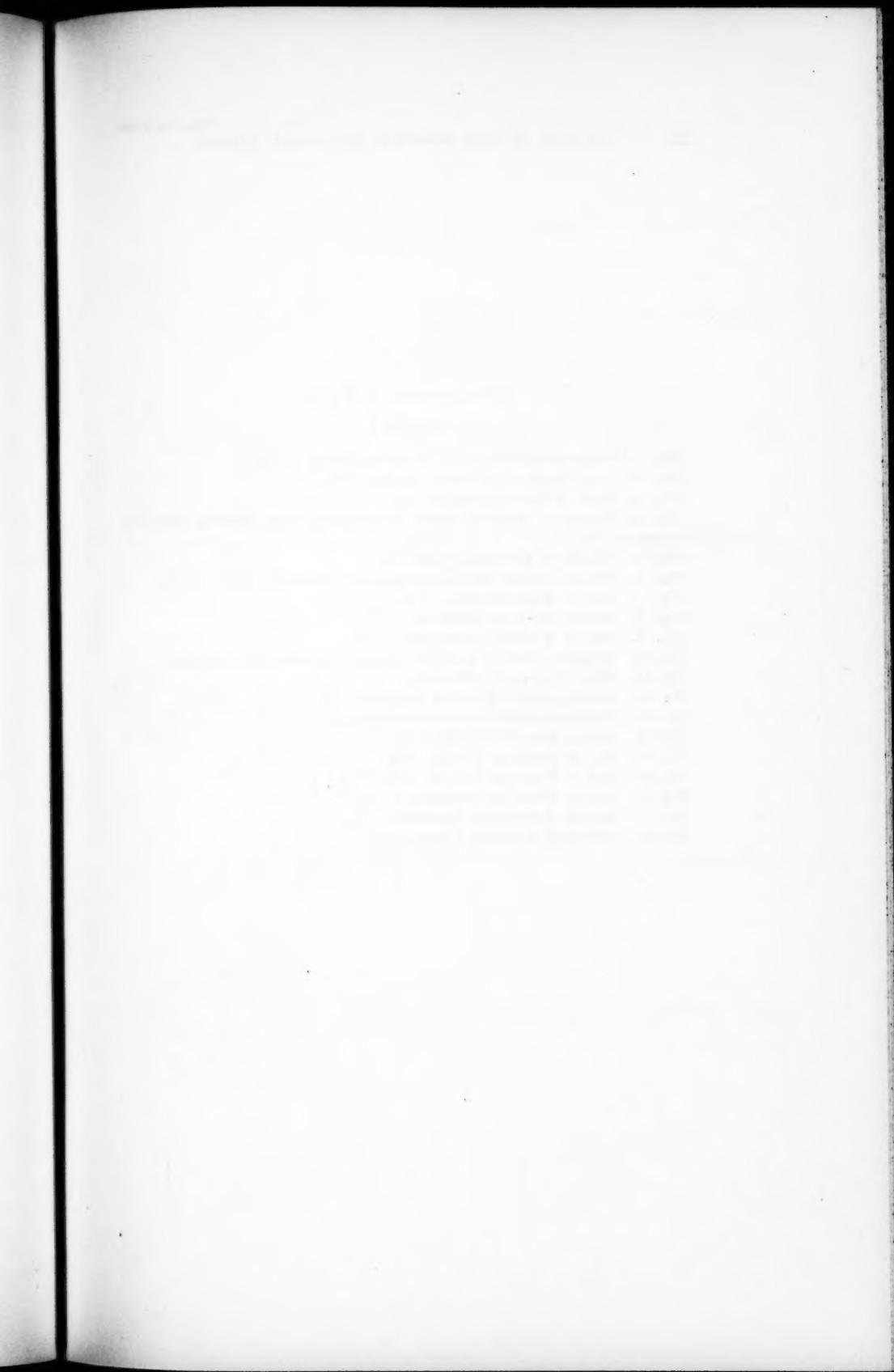
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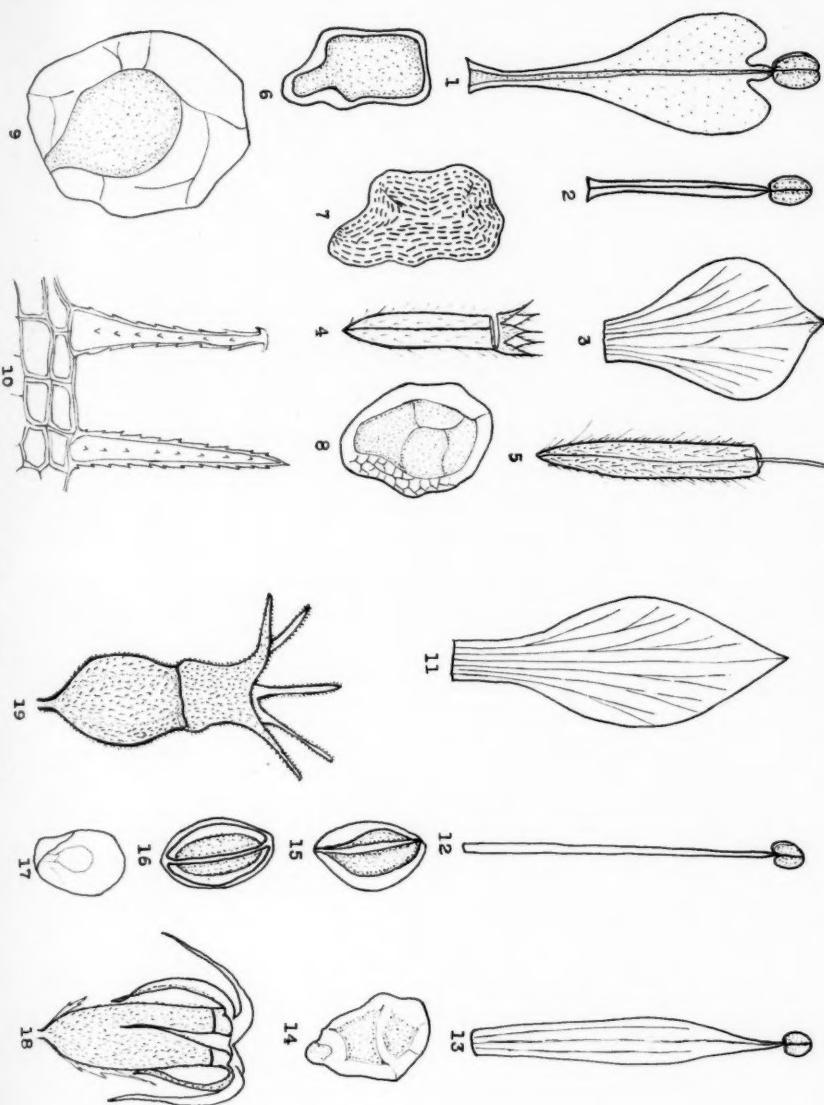
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| <i>strictissima</i> | 164 | <i>nuda</i> | 162 |
| <i>Wrightii</i> | 160 | <i>ornata</i> | 140 |
| <i>Torreya</i> | 112 | <i>parviflora</i> | 147 |
| <i>nuda</i> | 162 | <i>perennis</i> | 154 |
| <i>ornata</i> | 140 | <i>pterosperma</i> | 174 |
| <i>Touterea</i> | 112 | <i>pumila</i> | 168 |
| <i>Brandegeei</i> | 152 | <i>Busbyi</i> | 172 |
| <i>ohrysantha</i> | 171 | <i>sinuata</i> | 165 |
| <i>decapetala</i> | 140 | <i>speciosa</i> | 165 |
| <i>densa</i> | 157 | <i>striota</i> | 143 |
| <i>humilis</i> | 155 | <i>Wrightii</i> | 160 |
| <i>integra</i> | 175 | Trachyphytum (section) | 178 |
| <i>laciniata</i> | 173 | Trachyphytum | 112 |
| <i>laevicaulis</i> | 147 | congestum | 188 |
| | | gracile | 185 |

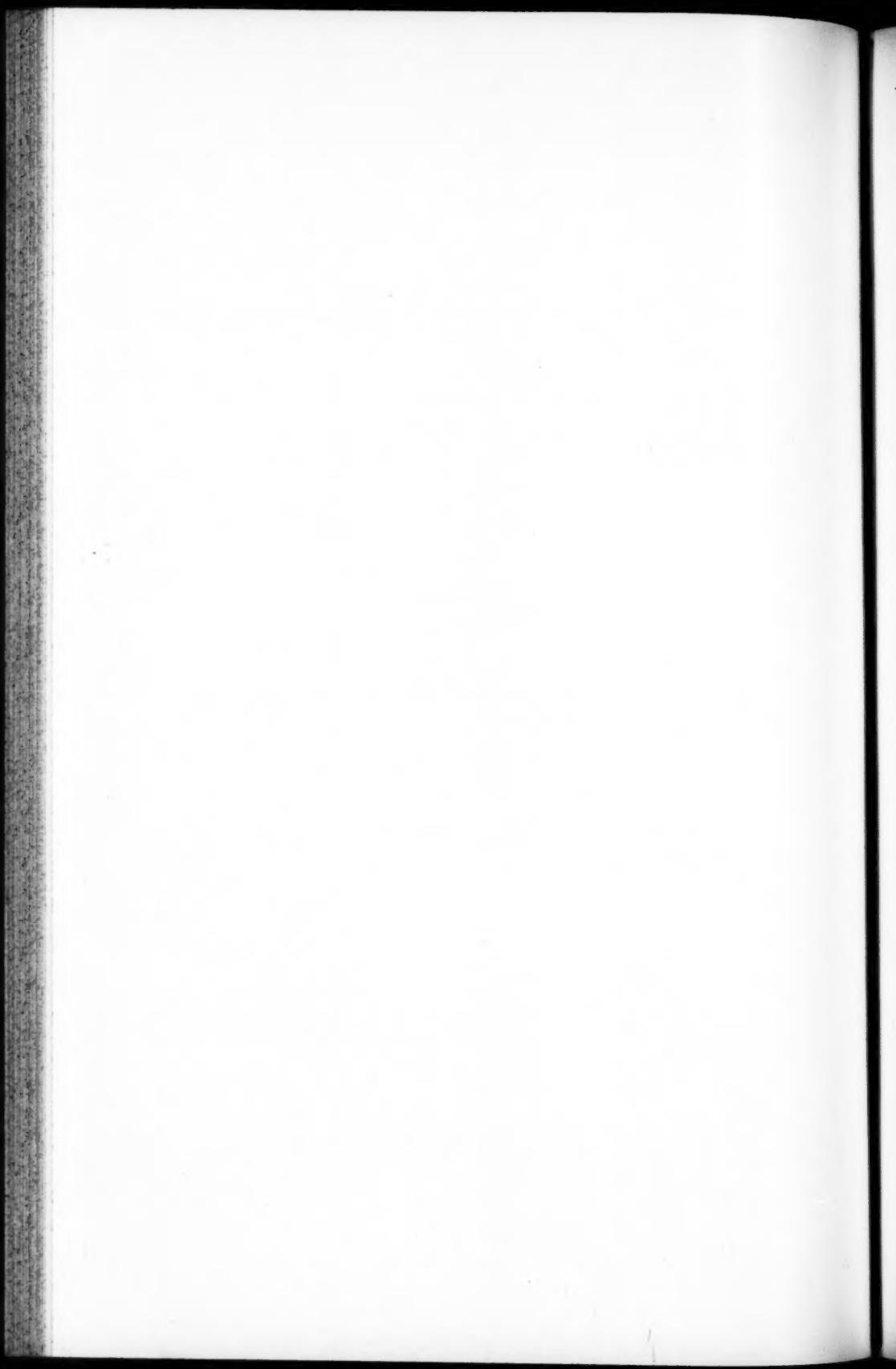


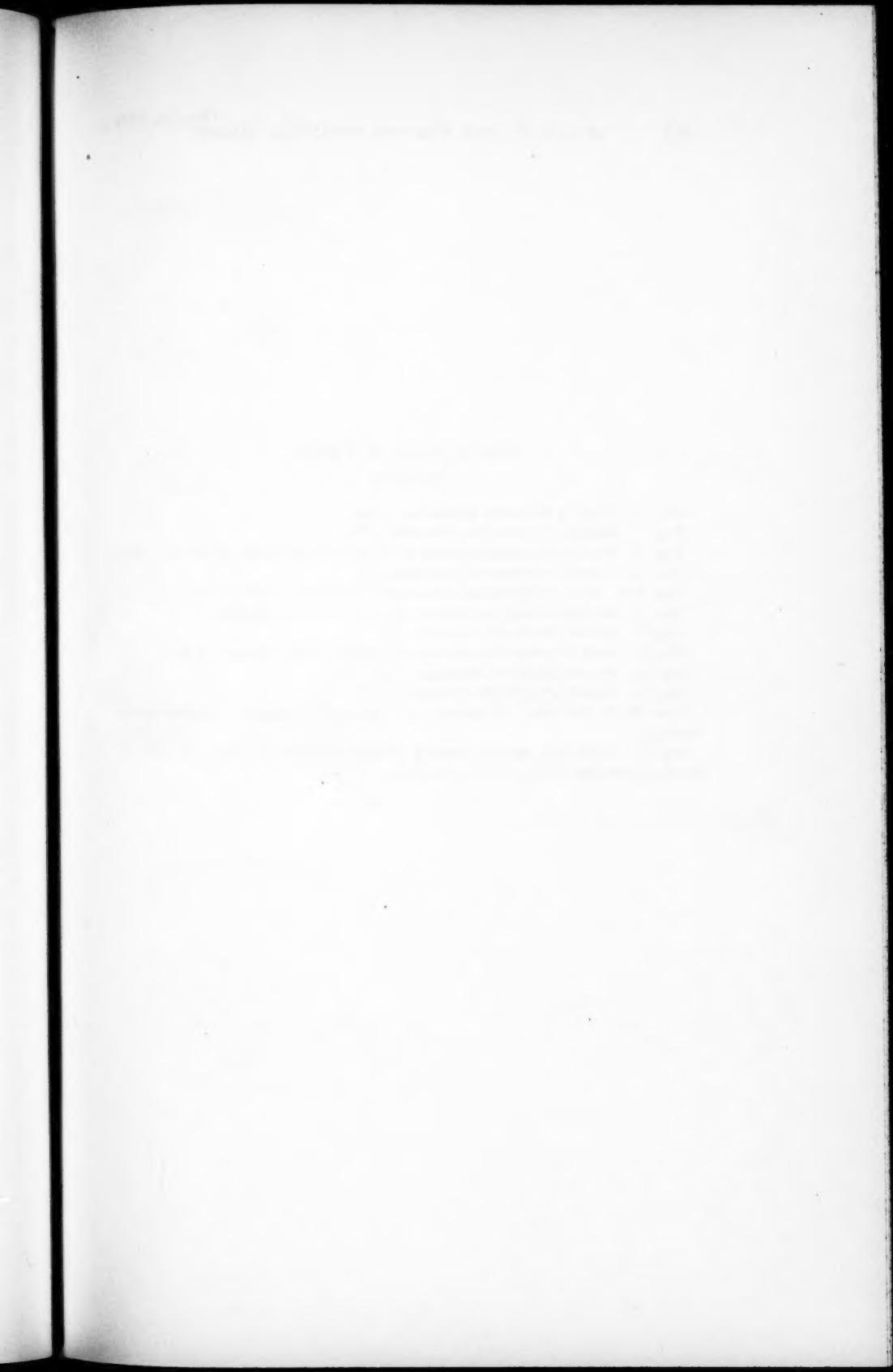
EXPLANATION OF PLATE

PLATE 4

- Fig. 1. Outer petaloid stamen of *Mentzelia aspera*. $\times 7\frac{1}{2}$.
- Fig. 2. Inner stamen of *Mentzelia aspera*. $\times 7\frac{1}{2}$.
- Fig. 3. Petal of *Mentzelia aspera*. $\times 3$.
- Fig. 4. Capsule of *Mentzelia aspera*, showing calyx-lobes breaking away from the calyx. $\times 1\frac{1}{2}$.
- Fig. 5. Capsule of *Mentzelia aspera*. $\times 3$.
- Fig. 6. Embryo and surrounding endosperm of *Mentzelia aspera*. $\times 7\frac{1}{2}$.
- Fig. 7. Seed of *Mentzelia aspera*. $\times 3$.
- Fig. 8. Seed of *Mentzelia adhaerens*. $\times 7\frac{1}{2}$.
- Fig. 9. Seed of *Mentzelia arboreascens*. $\times 7\frac{1}{2}$.
- Fig. 10. Epidermal hairs of *Mentzelia asperula* (camera-lucida drawing).
- Fig. 11. Petal of *Mentzelia albicaulis*. $\times 1$.
- Fig. 12. Inner stamen of *Mentzelia laevicaulis*. $\times 1$.
- Fig. 13. Outer stamen of *Mentzelia laevicaulis*. $\times 1$.
- Fig. 14. Seed of *Mentzelia reflexa*. $\times 7\frac{1}{2}$.
- Fig. 15. Seed of *Mentzelia Torreyi*. $\times 7\frac{1}{2}$.
- Fig. 16. Seed of *Mentzelia Torreyi*. $\times 7\frac{1}{2}$.
- Fig. 17. Seed of *Mentzelia laevicaulis*. $\times 7\frac{1}{2}$.
- Fig. 18. Capsule of *Mentzelia laevicaulis*. $\times \frac{3}{2}$.
- Fig. 19. Capsule of *Mentzelia Torreyi*. $\times 3$.



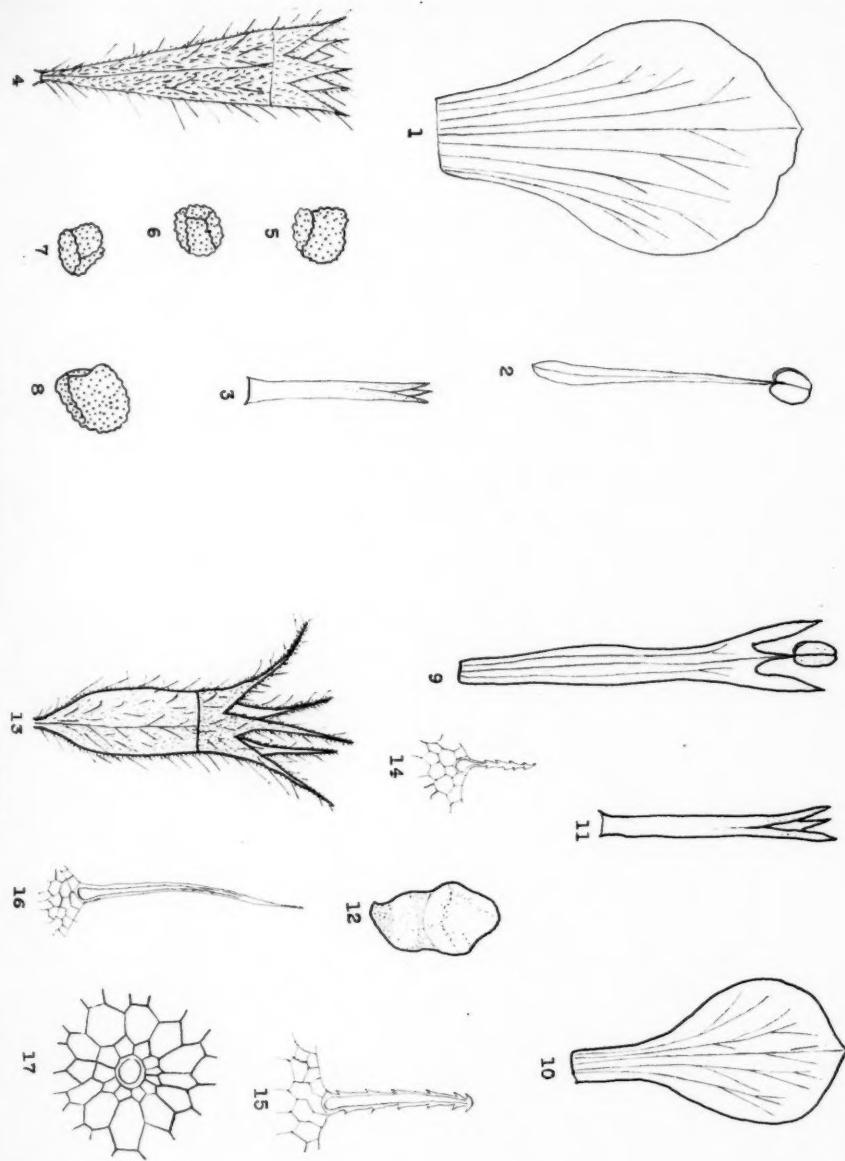


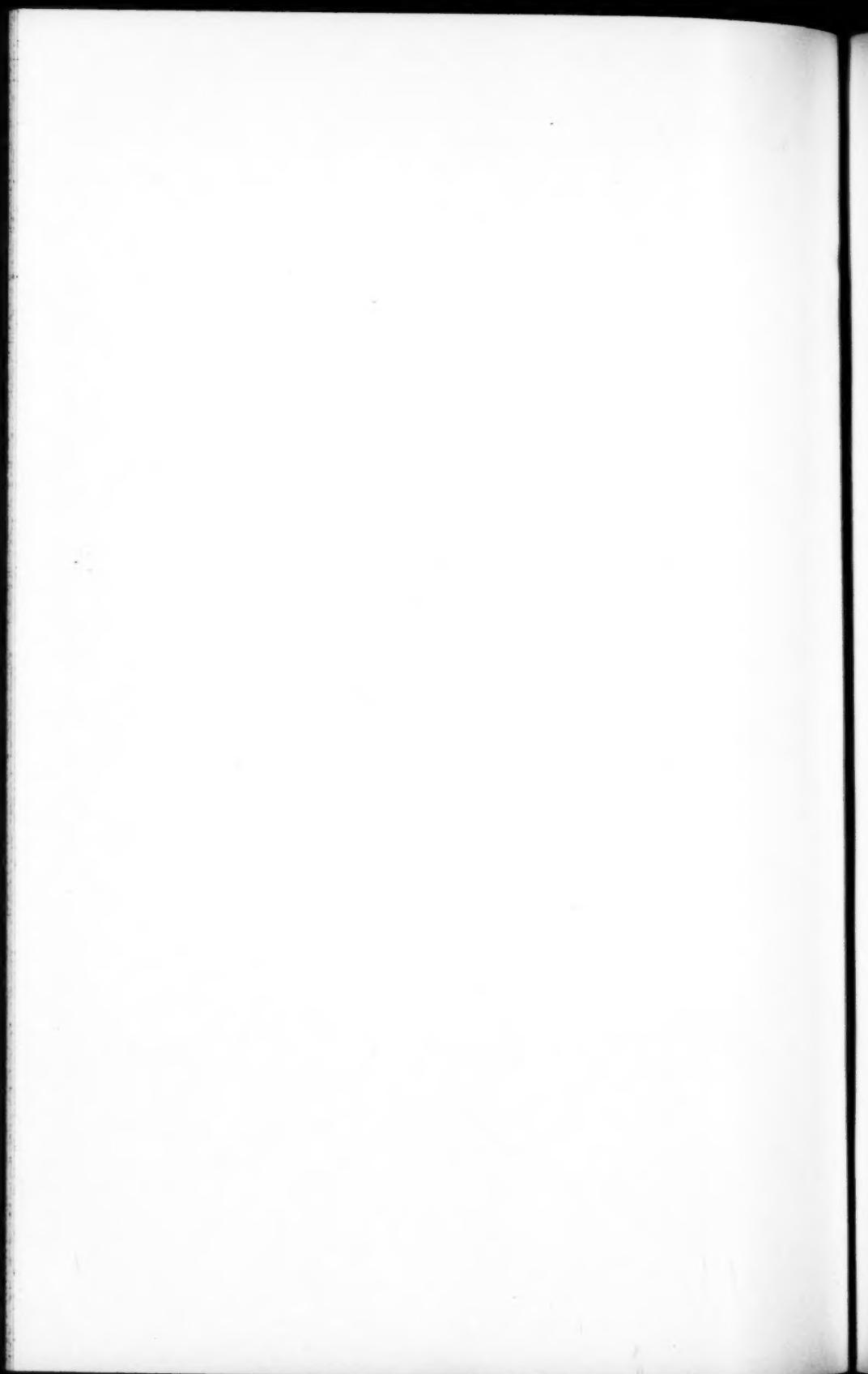


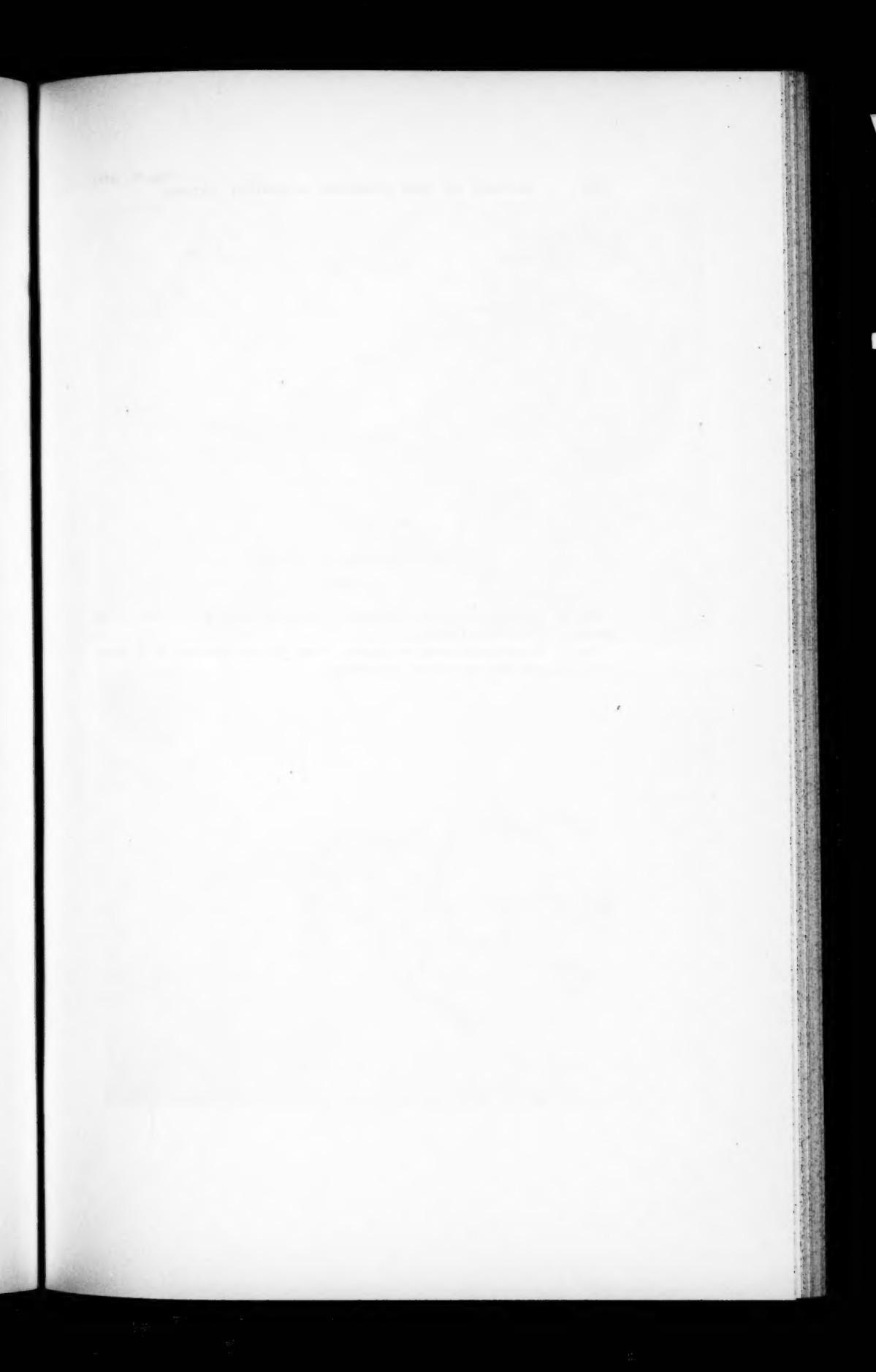
EXPLANATION OF PLATE

PLATE 5

- Fig. 1. Petal of *Mentzelia albicaulis*. $\times 7\frac{1}{2}$.
Fig. 2. Stamen of *Mentzelia albicaulis*. $\times 7\frac{1}{2}$.
Fig. 3. Showing stigmatic surfaces of the style of *Mentzelia albicaulis*. $\times 7\frac{1}{2}$.
Fig. 4. Capsule of *Mentzelia albicaulis*. $\times 3$.
Figs. 5-8. Seeds of *Mentzelia albicaulis* from different angles. $\times 7\frac{1}{2}$.
Fig. 9. Stamen showing bicuspitate apex of *Mentzelia tricuspis*. $\times 7\frac{1}{2}$.
Fig. 10. Petal of *Mentzelia tricuspis*. $\times 2$.
Fig. 11. Style showing stigmatic surfaces of *Mentzelia tricuspis*. $\times 2$.
Fig. 12. Seed of *Mentzelia tricuspis*. $\times 3$.
Fig. 13. Capsule of *Mentzelia tricuspis*. $\times 1\frac{1}{2}$.
Figs. 14-16. Showing pubescence of *Mentzelia tricuspis* (camera-lucida drawing).
Fig. 17. Epidermal surface showing cellular structure at base of hair of *Mentzelia tricuspis* (camera-lucida drawing).





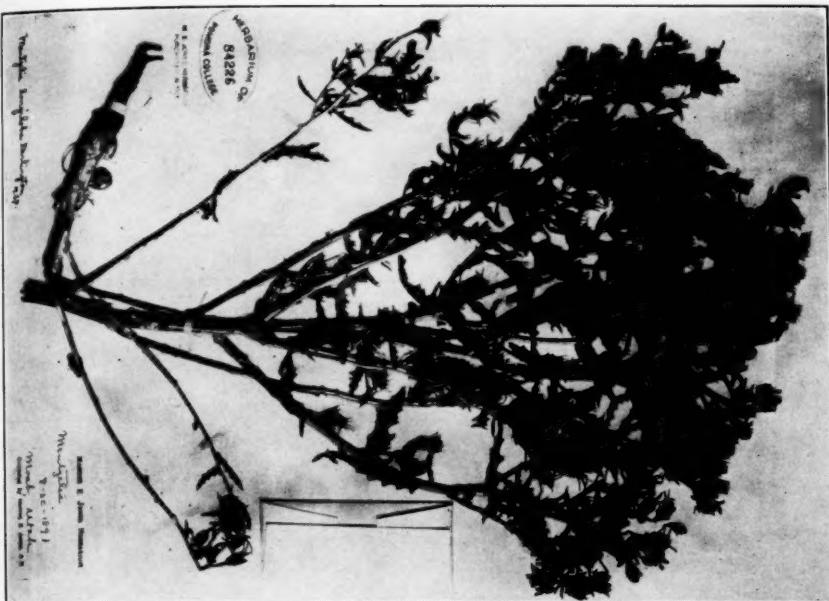


EXPLANATION OF PLATE

PLATE 6

Fig. 1. *Mentzelia longiloba* Darlington. From specimen, *M. E. Jones*, in the Herbarium of Pomona College.

Fig. 2. *Mentzelia oreophila* Darlington. From the type specimen, *M. E. Jones*, in the Missouri Botanical Garden Herbarium.





STUDIES IN GRINDELIA. I¹

NEW SPECIES, VARIETIES, AND COMBINATIONS OF GRINDELIA

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of Washington University*

In the course of an extended critical monographic study of the genus *Grindelia*, it has been found necessary to describe a number of new species, varieties, and forms, in addition to making new combinations. The following represent a part of such novitates, which will be elaborated and discussed in more detail in a future publication concerning the entire genus.

***Grindelia squarrosa* (Pursh) Dunal var. *serrulata* (Rydb.) Steyermark, comb. nov.**

G. serrulata Rydb. in Bull. Torr. Bot. Club 31: 646. 1904.

***Grindelia rubricaulis* DC. var. *bracteosa* (Howell) Steyermark, comb. nov.**

G. bracteosa Howell in Madroño 2: 22. 1931.

***Grindelia rubricaulis* DC. var. *robusta* (Nutt.) Steyermark, comb. nov.**

G. robusta Nutt. in Trans. Amer. Phil. Soc. N. S. 7: 314. 1841.

***Grindelia rubricaulis* DC. var. *latifolia* (Kellogg) Steyermark, comb. nov.**

G. latifolia Kellogg in Proc. Cal. Acad. 5: 36. 1873.

***Grindelia rubricaulis* DC. var. *platyphylla* (Greene) Steyermark, comb. nov.**

G. robusta Nutt. var. *platyphylla* Greene, Pitt. 2: 289. 1892.

***Grindelia rubricaulis* DC. var. *elata* Steyermark, var. nov.,**
caulibus supra valde corymbifere ramosis, ramosculis floriferis elongatis adscendentibus valde divaricatis, glabris, 6–12 dm. altis; foliis in ramosculis floriferis plerumque reductis et

¹ Issued April 12, 1934.

adversum capitulos multum parvioribus, omnibus firmiter membranaceis vel subcoriaceis, grosse remote vel crebre dentatis vel serratis, dentibus latis acutis vel triangularibus saliente acuminatis vel parce serratis, foliis caulinis principalibus mediis et inferioribus 3.5–7.5 cm. longis, 0.7–1.8 cm. latis, 3–9 plo longioribus quam latioribus, linearis vel anguste oblongis vel oblanceolatis vel oblongo-lanceolatis, acutis vel obtusis, ad basem plerumque angustatis, illis in ramosculis floriferis 1–2.3 cm. longis, 0.2–1 cm. latis, plerumque 1½–3 plo longioribus quam latioribus, ovatis vel ovato-lanceolatis vel lanceolatis, acutis vel acuminatis, valde amplexicaulibus, omnibus glabris; involucro abundanter resinosissimo 6–7 seriato, bracteis valde reflexis vel revolutis, extremis plerumque congestis, subteretibus, subcoriaceis; ligulis 8–12 mm. longis; aristis plerumque 2.—Collected on clay hills, 7 miles southwest of Simi, Ventura Co., California, May 29, 1931, J. T. Howell 6574 (Cal. Acad. Sci. Herb. No. 188491 TYPE, Mo. Bot. Gard. Herb. photograph).

Grindelia camporum Greene var. **australis** Steyermark, var. nov., caulis 3–7 dm. altis, glabris, supra subcorymbifere vel subpaniculate ramosis, ramosculis floriferis brevibus crebre adscendentibus saepe prope summas ramosculorum congestis; foliis valde resinoso-punctatis, omnibus foliosis, subcoriaceis, foliis caulinis principalibus mediis et superioribus 3–7 cm. longis, 1–2.5 cm. latis, 2–4 plo longioribus quam latioribus, oblongis vel ovato-oblongis vel ovatis, apice apiculatis, valde amplexicaulibus, saepe saliente denticulatis vel spinuloso-denticulatis, dentibus brevibus, basibus latis, apicibus acutis vel spinulosis; disco 1–1.3 cm. alto, 1.2–2 cm. lato; involucri bracteis valde reflexis vel valde recurvatis vel revolutis.—Collected at base of dry slope, 3 miles east of Elizabeth Lake, Los Angeles Co., California, Sept. 4, 1928, P. A. Munz & I. M. Johnston 11157 (Pomona Coll. Herb. TYPE).

Grindelia camporum Greene var. **abbreviata** Steyermark, var. nov., caule glabro; foliis subcoriaceis, abundanter resinoso-punctatis, ut videtur lucidis, adversum capitulos redditis; disco parvo, 0.8–1 cm. alto, 1–1.2 cm. lato; involucri

bracteis brevibus, 2–8 mm. longis, apicibus brevibus, 1.5–2.5 mm. longis, paullo patentibus vel adscendentibus; aristis circiter 4 mm. longis.—Collected on alkaline flats, Lancaster, Los Angeles Co., Sept. 23, 1927, Hoffmann (Herb. Santa Barbara Mus. TYPE).

Grindelia hirsutula Hook. & Arn. var. **subintegra** Steyermark, var. nov., caulis et foliis plus minusve puberulis; foliis integris vel subintegratis; involuci bracteis apicibus erectis vel adscendentibus, glabris.—Collected on grassy hillside, 2 miles east of Ojai, Ventura Co., July 1, 1933, J. T. Howell 11414 (Mo. Bot. Gard. Herb. No. 1044105 TYPE, Cal. Acad. Sci. Herb. isotype); dry field, Ojai, Ventura Co., June 4, 1927, Hoffmann (Herb. Santa Barbara Mus.).

Grindelia Hallii Steyermark, sp. nov., caulis tenuibus, 2.5–6 dm. altis; foliis subcoriaceis, abundanter et conspicue resinoso-punctatis, serrulatis vel saliente serratis vel integris, foliis caulinis mediis et inferioribus 2.5–7.5 cm. longis, 0.7–1.2 cm. latis, 3½–7½ plo longioribus quam latioribus, oblongis vel oblongo-ob lanceolatis vel oblongo-lanceolatis, foliis caulinis superioribus et illis in ramosculis floriferis oblongo-lanceolatis vel lanceolatis; capitulis parvis, 1.5–2 cm. latis; disco parvo, campanulato-hemispherico, 0.7–1 cm. alto, 0.8–1.7 cm. lato; involucro abundanter resinoso, involuci bracteis exterioribus et mediis apicibus brevibus erectis, adscendentibus, patentibus vel paullo reflexis acutis vel acuminatis, 2–8 mm. longis, lanceolatis vel linear-lanceolatis; ligulis 10–20, 8–9 mm. longis, 2–3 mm. latis; achaeniis 4.5–5 mm. longis, circiter 2 mm. latis, laevibus vel sulcatis, apice uni-dentato vel oblique truncato; aristis tenuibus, integris, 2.5–4 mm. longis, ½–¾ (plerumque ½–¾) longitudinem disci floris aequantibus.—Collected in open meadows about Cuyamaca Lake, San Diego Co., California, June 30, 1903, L. R. Abrams 3957 (N. Y. Bot. Gard. Herb. TYPE, Gray Herb., Mo. Bot. Gard. Herb., Field Mus. Herb., and Pomona College Herb., isotypes).

Grindelia arenicola Steyermark, sp. nov., caulis prostratis e basi subligneis vel herbacea tenuis, ramosculis floriferis supra

laxe corymbifere divaricataeque ramosis vel ramosculis elongatis simplicibus monocephalatis, glabris, 3–5 dm. altis; foliis firmis vel subcoriaceis, abundanter et plus minusve valde resinosis, foliis caulinis principalibus saliente serrulatis, serratis vel dentatis saepe modo supra medium vel circiter apicem, illis in ramosculis floriferis saepe infra capitulos reductis congestis et integris, foliis caulinis principalibus mediis et inferioribus 3–6 cm. longis, 0.8–2 cm. latis, 3–4 plo longioribus quam latioribus, spatulatis vel oblongo-vel oblanceolato-spatulatis, plerumque obtusis, foliis radicalibus vel basilaribus cuneatis vel obovato-cuneatis, apice obtusis vel subtruncatis; disco 0.8–1.2 cm. alto, 1.2–2 cm. lato; involuero abundantiter et valde resinoso, bractearum parte superiore laxe revoluta vel valde reflexa; ligulis 19–34, aureo-luteis, 11–14 mm. longis, 2.5–3 mm. latis; achaeniis 3–4.5 mm. longis, 1.3–1.6 mm. latis; aristis 3–5, plerumque moderatim serrulatis vel setuloso-serrulatis vel setulosis, 3–4.5 mm. longis.—Collected in swale-like hollows in sand dunes, Mendocino Coastal plain, 4.5 miles north of Ft. Bragg, Mendocino Co., California, Sept. 14, 1930, J. T. Howell 5473 (Cal. Acad. Sci. Herb. No. 187937 TYPE, Univ. Cal. Herb., Gray Herb. and Mo. Bot. Gard. Herb., isotypes).

